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PC WORLD

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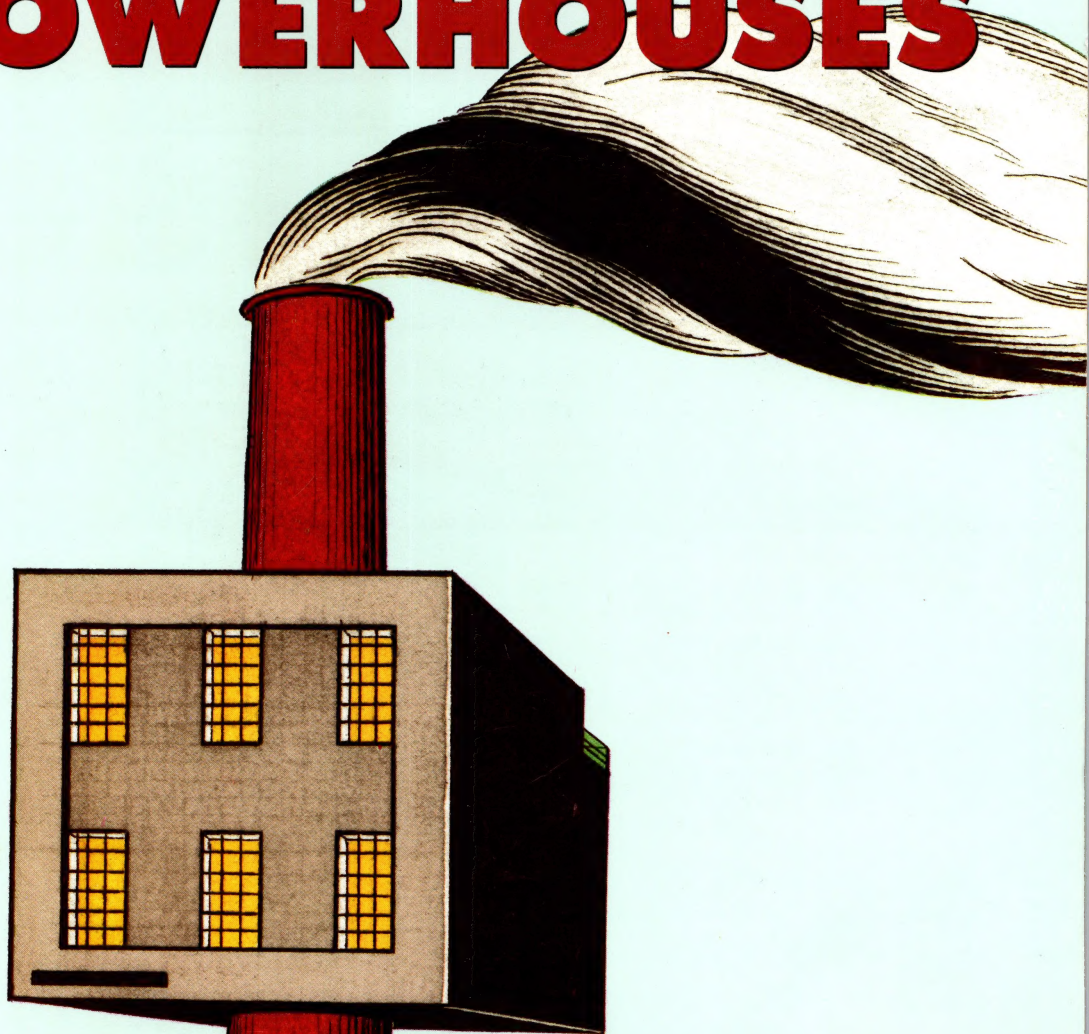
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WordPerfect 4.2	41.1	7.5	5.4	6.6	6.2
WordStar 4.0	4.4	8.1	4.7	17.1	13.8
MS Word 4.0	9.7	49.4	N/A	4.6	7.0
MultiMate	1.0	21.0	N/A	13.4	20.6

Tests were performed on an Acer 286 (8 MHz), 640K RAM. ¹File size 103K. ²1636 lines.

³14 occurrences. Times shown are in seconds. (Benchmark details available upon request.)

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Files Open (maximum)	24	2	8	1	1
Cross-Reference (dynamic)	●	○	○	○	○
Indexing Options	7	1	3	3	○
Snaking Columns (chg # on same page)	●	●	Not same pg.	○	●
Parallel Columns	●	●	●	●	●
H-P LaserJet Support	Full	Partial	Full	Partial	Full
PostScript Support	Full	Text	Full	○	Text
Mouse Support (integrated)	●	○	●	○	○
AutoSave (without interruption)	●	○	○	○	○
Define Shortcuts Dynamically	●	○	○	○	○
Run Alternative User Interface	●	○	○	○	○
Verify spelling as you type	●	○	○	○	○
Fully programmable macro language	●	○	○	○	○
Suggested List Price	\$199.95	\$495.00	\$450.00	\$495.00	\$565.00

● = Yes ○ = No

Circle 21 on reader service card

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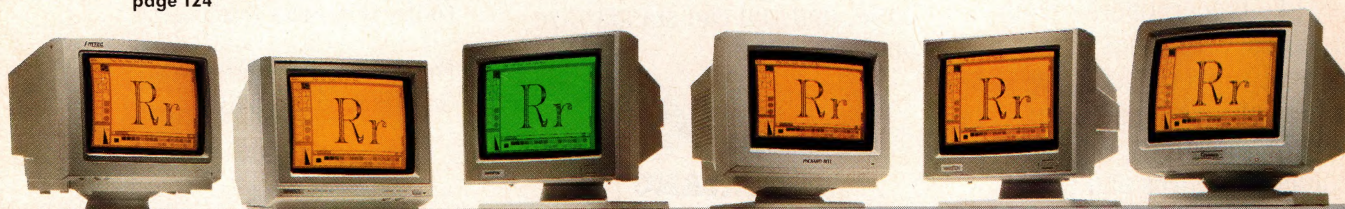
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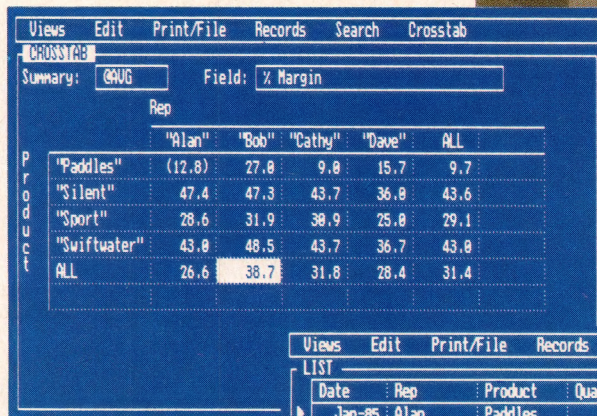
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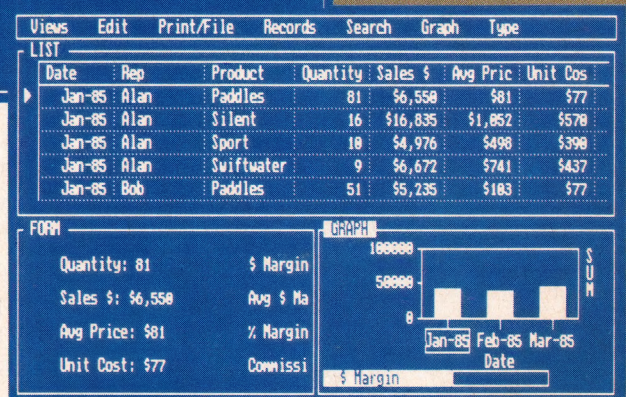
The Reflex Workshop, available separately, gives you 22 master templates for running almost any kind of business. The formats are all there; you just plug in the numbers.



	"Alan"	"Bob"	"Cathy"	"Dave"	ALL
"Paddles"	(12.8)	27.8	9.8	15.7	9.7
"Silent"	47.4	47.3	43.7	36.8	43.6
"Sport"	28.6	31.9	38.9	25.8	29.1
"Swiftwater"	43.8	48.5	43.7	36.7	43.8
ALL	26.6	38.7	31.8	28.4	31.4

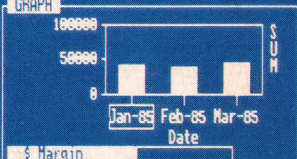
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Date	Rep	Product	Quantity	Sales \$	Avg Price	Unit Cost
Jan-85	Alan	Paddles	81	\$6,558	\$81	\$77
Jan-85	Alan	Silent	16	\$16,835	\$1,052	\$578
Jan-85	Alan	Sport	10	\$4,976	\$498	\$398
Jan-85	Alan	Swiftwater	9	\$6,672	\$741	\$437
Jan-85	Bob	Paddles	51	\$5,235	\$183	\$77

Quantity	\$ Margin
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10	\$4,976
9	\$6,672
51	\$5,235



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Buyer Be Smart



TJ Byers (left) and Lewis Perdue review low-cost XT and AT clones.

The high-priced, high-performance products may get most of the attention, but it still pays to watch the low end of the PC marketplace. For the price of a single IBM PS/2 Model 80, for example, you can pick up 6 AT clones—or 11 XT clones—with enough change left over to pay for an impressive shareware library. But do these inexpensive alternatives deliver the performance you need? This month, we asked two top reviewers to look at five AT and five XT clones and answer the question definitively.

Authors TJ Byers (“Business-Class ATs”) and Lewis Perdue (“XTs for Bargain Hunters”) brought unique backgrounds to the assignment. Perdue has worked as an investigative reporter for the *Washington Post*; more recently, he managed PC operations and user support for a Los Angeles-based public relations firm. Byers earned his B.S. in electrical engineering and worked on NASA’s Surveyor mission before becoming a computer journalist. (Byers had a busy month—he also wrote “Viewers’ Choice: 13 Monochrome Monitors” for *PC World*.)

For less than \$2000, each AT clone included a 40MB hard disk and a monochrome monitor and graphics card; yet in NSTL tests they compared favorably with better-known systems costing thousands of dollars more. Our five XT look-alikes averaged well under \$1200, complete with 20MB hard disk and mono-

chrome graphics. At that price, they demand serious consideration in any PC budget.

Among the ATs, Byers found that “there’s little difference in performance or price. Most of the systems use quality, off-the-shelf parts and offer two-year warranties.”

Perdue found the same was true of the XT-class machines. “When it comes to parts,” he reports, “these systems are just about clones of each other. Pull the cover off, and you genuinely need a scorecard to tell the differences.”

Is there a danger to buying a bargain-basement system through the mail? “These are not computers for the first-time user,” Perdue warns. “You have to shop carefully. The biggest downside is lack of support—and you don’t have a right to expect much support at those prices.”

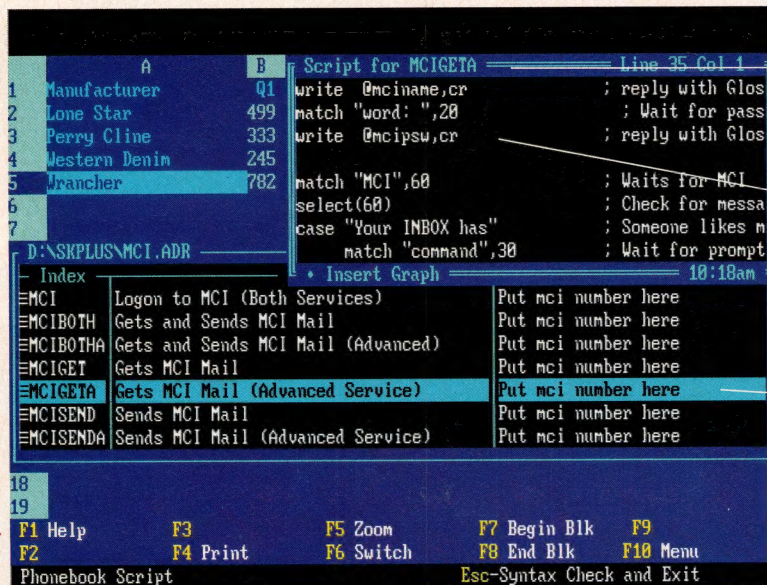
Also in this issue: Judy Getts (“Shareware Comes of Age”) talked with the pioneers of try-before-you-buy software, while George Campbell (“Buyers’ Guide: Best of Shareware”) sifted through hundreds of not-quite-commercial programs to find the very best. Campbell also contributed “Word Speedup Tips,” an essential reference for anyone who’s ever lost patience with Microsoft’s flagship word processor. If you don’t need the complexity—or the price tag—of the heavyweight relational data base managers, check out “Five Flat-File Favorites.” And don’t miss a new feature in *PC World*: You’ll find bright red Power Tips—short productivity boosters for every application—scattered throughout the magazine.

Ed Bott

Ed Bott
Managing Editor

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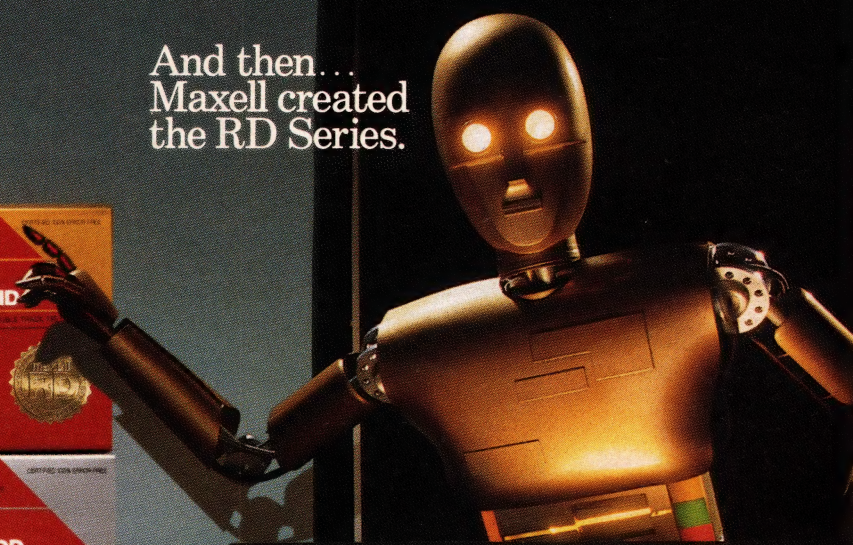
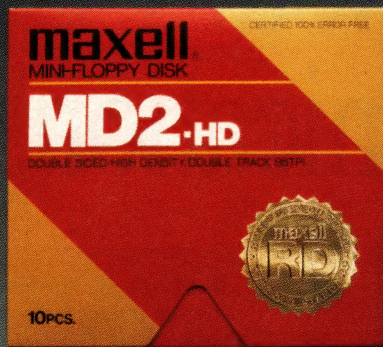
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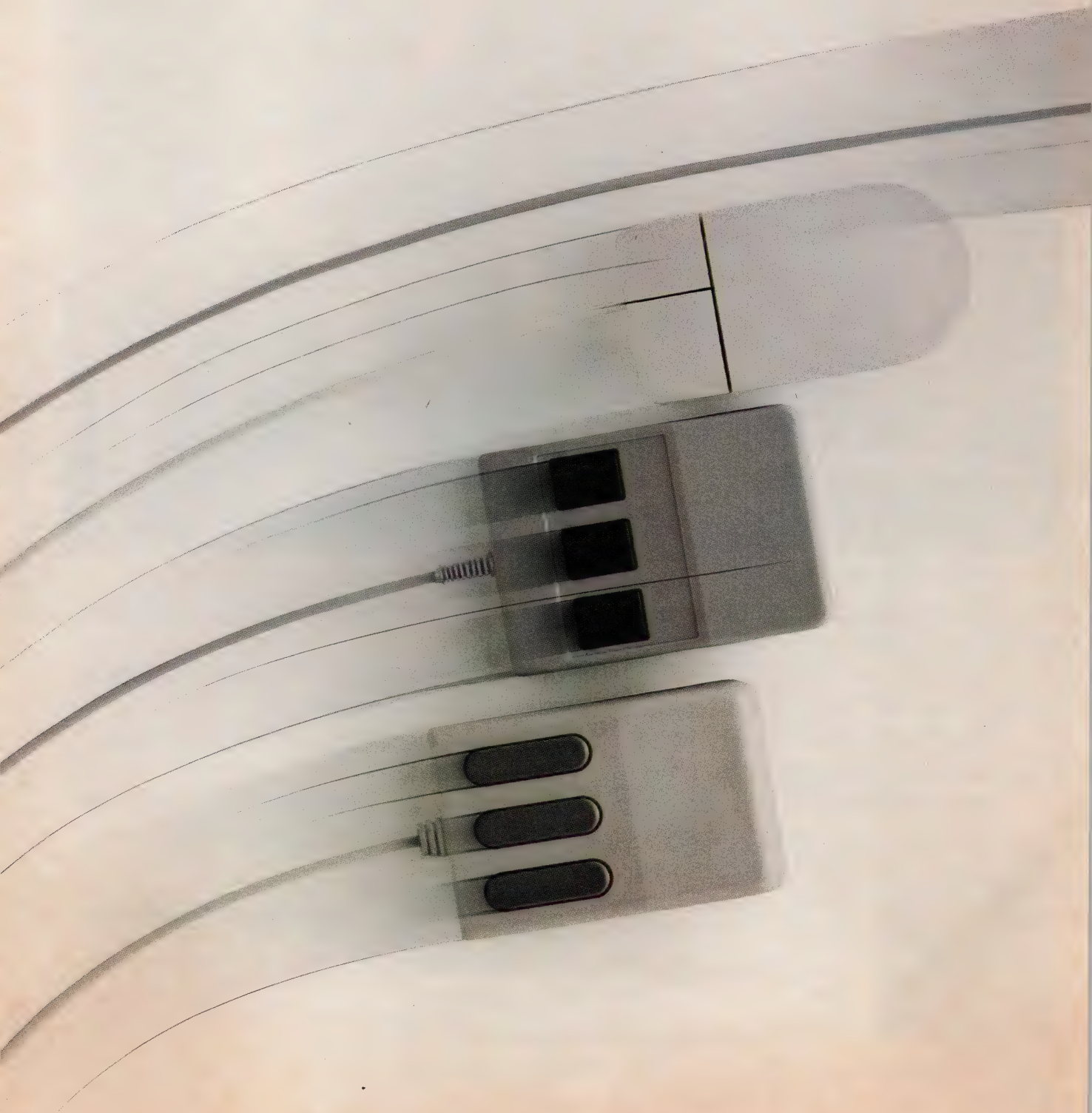


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getting started, for example. Key Tronic's documentation is written in clear and easy-to-follow English — instead of "computerese."

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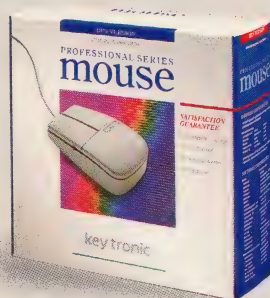
The mouse has even been carefully designed to fit the contour of your hand — a benefit that translates into less fatigue, greater productivity, and a lot more enjoyment.

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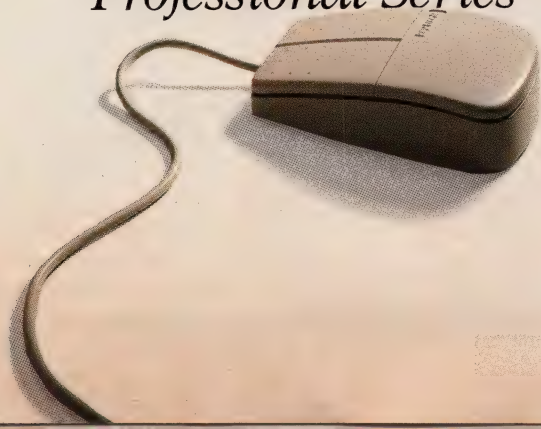
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TOP OF THE NEWS

New PS/2s Raise Questions

*Analysts
Downplay
Product
Line "Fixes"*

The PS/2s IBM introduced in June were intended to "fix" the Model 50, put 80386-based computers on the desktop, and extend the line's performance (see the *IBM Preview* in this issue). But some analysts feel that the introductions create more problems for IBM customers than they solve. IBM answered speed and storage complaints about the Model 50 with a Model 50 Z featuring 35 percent faster throughput and up to 60MB worth of storage. However, the three-slot 50 Z is faster than the Model 60, which offers seven slots and larger hard disks—forcing users to choose between processor speed and expandability. At \$4595 with a 60MB disk, the 50 Z is also \$1200 cheaper than the Model 60-71. Similarly, IBM's high-end desktop 386, the 25-MHz Model 70-A21, runs up to half again as fast as the former top-of-the-line Model 80-311. But

customers again must choose between the Model 70's speed and the similarly priced Model 80's greater I/O and storage options. International Data Corporation analyst Will Zachmann concludes that current Models 50, 60, and 80 are "rendered obsolete by and lack any coherence with the new models." The debuts reveal Models 60 and 80 for "the PS/2jrs they always were," asserts Zachmann. "It must leave customers who bought these things feeling like they've been had." Industry analysts had expected more powerful models, perhaps including portables, and a significant DOS upgrade. Given heavy discounting on PS/2s, they also anticipated much more extensive price cuts on existing models than IBM actually made.

VGA Coming to Laptops

*Manufacturers
Bypass EGA
Graphics in a
Race to VGA*

Laptop makers are skipping over EGA-quality graphics and racing to be first with a VGA-compatible display. Yamaha Systems Technology Division, the chip maker responsible for the display controller employed in approximately 80 percent of the laptops on the market, has developed single-chip controllers for both EGA and VGA graphics on laptops. But laptop manufacturers are looking past EGA's 640 by 350 resolution to the 640 by 480 of VGA, reports National Marketing Manager Bob Starr, who expects to see VGA-quality monochrome displays in a laptop sometime around the first of the year. Color is also a possibility with

Yamaha's new EGA- and VGA-compatible controller chips, scheduled for fourth-quarter release. But screen makers have achieved only CGA-quality color resolution so far, and they don't want to release color before achieving VGA quality, says Starr. The current monochrome standard for laptops and transportables is the so-called double-scan CGA, which produces 640 by 200 resolution text and graphics on 640 by 400 electroluminescent, gas plasma, liquid crystal, or CRT displays. "The interesting thing," adds Starr, "is that no one is developing a [PS/2] Micro Channel implementation. They are sticking with the AT bus."

Borland Buys Surpass Technology

*Quattro/Surpass Hybrid
to Come*

This year's spreadsheet war has claimed its first casualty with Borland International acquiring the rights to *Surpass* spreadsheet technology for an undisclosed amount of cash and stock. Borland president Philippe Kahn would not elaborate on what changes this may mean for *Quattro*, except to say that five *Surpass* engineers will join the *Quattro* team at Borland's Belmont, California, R&D facility. However, *Surpass* Software Systems CEO and principal stockholder Seymour Rubinstein predicts that the next iteration of *Quattro* will look more like *Surpass*, acquiring the latter's ability to link worksheets and, possibly, its rich windowing interface. Rubinstein, who has sunk \$2 million into

Surpass, previously sought a merger with a Canadian company as an inexpensive way to go public and raise the \$3 million that he estimates his company would have needed to survive. *Surpass* will be withdrawn from the market, but its 5000 users will be supported by *Surpass* Software through the end of the year, and they can buy the current or next version of *Quattro* for \$49.95. "This acquisition will position Borland to become the leading competitor in the spreadsheet wars," predicts Rubinstein, "because it will have the best technology combined with marketing excellence." Kahn reports 130,000 copies of *Quattro* sold to date.

Disk Saver Debuts

Utility Formats a Hard Disk Without Data Loss

Veteran PC technologist Steve Gibson has developed a software program that he claims will do what has heretofore been impossible—reformat a hard disk without destroying its data. *SpinRite* promises to rescue users from many kinds of hard disk crashes. But its principal application is to recondition Winchesters whose read/write heads have “drifted” out of alignment after months of use. When that happens, the disk’s interleave ratio (the number of times a platter revolves as the disk reads contiguous data sectors) often slips from the typical 3:1 into higher ratios, and unidentified defects on a platter come under the heads. *SpinRite* speeds up hard disk throughput 50 to 600 percent,

says Gibson, by realigning platter sectors to the heads and to one another so that contiguous sectors are read in as few as two revolutions. The program also identifies unmapped defects by applying 82 test patterns to every byte. Data at risk is moved to safe sectors, and the “bad” sector is set aside. “It took me all of 1987 to create this product,” reports Gibson. “It’s 500K of assembly source code.” His firm, Gibson Research of Laguna Hills, California, has not yet formally introduced the program. But more than 3000 copies of *SpinRite* have sold for \$59 each and Gibson reports back orders of about 1500 units.

Toshiba Tabloid Laser Due

Printer Could Open Up New Markets With 11-by-17-inch Printing

Toshiba America reportedly is working on a competitively priced laser printer that will address a potentially lucrative subset of the laser printer market. The product will be aimed at accountants, financial analysts, and others who need to print large spreadsheets, as well as engineers who create A-size (8½ by 11) or B-size (11 by 17) drawings. Additionally, the printer will let desktop publishers print tabloid-size publications in-house and position graphics across the fold of two 8½-by-11-inch pages printed side by side. Such users are estimated to make up 20 percent of the laser printer market, and Toshiba figures that they are willing to pay a

premium commensurate with the new printer’s capabilities. While most hardware companies these days offer some kind of laser printer, Toshiba’s product reflects the company’s corporate strategy of avoiding commodity markets and focusing on those where it can add value with features based on its own technology. The new printer will utilize an 8-ppm Toshiba laser engine and a modular design for easy upgrades, plus a PostScript-compatible page-description language and up to 8MB of memory. Name, price, and release date have not been finalized.

Borland Offers Word Processor

Will Unique “Soft” Interface Be Right for Everyone?

Claiming that no one word processor is right for everyone, Borland International has introduced a program that it hopes will be just that. Having burgled the once-secure domains of Microsoft and Lotus with inexpensive turbo languages and *Quattro*, Borland hopes for a repeat performance in the more fragmented word processing arena. Borland’s *Sprint* gives the user the opportunity to completely customize its “soft” interface to his or her own way of working. Also available are optional command sets that copy *WordPerfect* and other popular word processors, while automatic background conversion routines make *Sprint* files compatible with those of the leaders. Recognizing two other market requirements, Borland has made *Sprint* fast and added desktop publishing features such as style sheets, kerning, and support for long documents, PostScript, and numerous printers and

fonts. Targeting ease of learning as well as ease of use, *Sprint* offers both a pop-up menu system and shortcuts around the menus for experienced users. It provides macros for executing multiple commands, supports multiple documents in up to six on-screen windows, and automatically saves file changes in the background between keystrokes. “Our goal is to be the number three word processor within a year,” asserts Product Manager Jonathan Prusky, who claims that *Sprint* became the number one word processor in France three months after its February release there. *Sprint* began shipping in June for \$199.95 plus \$99 for all the alternative user interfaces. Borland has been demonstrating it in public for more than a year. ●

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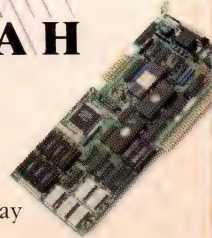
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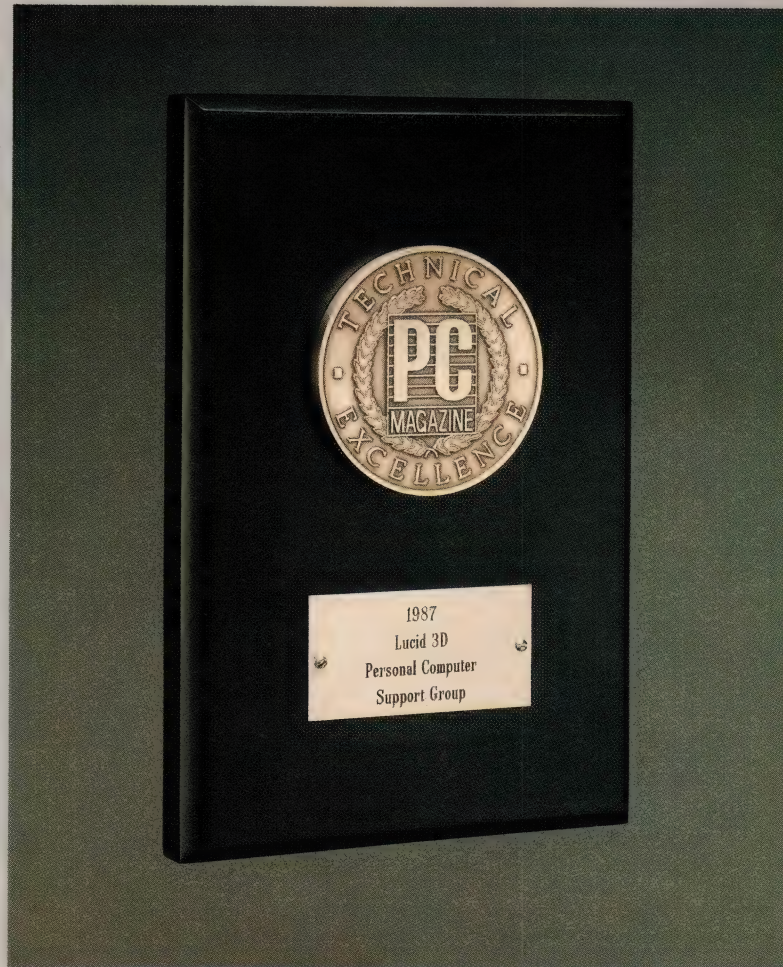
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PCSG'S

Lucid
3-D

and Microsoft Excel



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Don't take our word for it. Use Lucid 3-D for 60 days. Return it for a full refund if not completely satisfied. Plus, instead of the \$199 list price, an introductory spread-the-word price of \$149.

Lucid is as simple as the pictures show. And you don't have to write formulas to do that. All you do is look at the other file, navigating through easy, point and shoot directories. When you come back up (with one key) the link is made automatically for you.

Everything about Lucid works that way. Users say "It is so intuitive that I really don't need a manual." That's because we use something we call a visual command menu. Jim Seymour, the noted PC columnist, talking about Lucid in a recent article said, "If there ever was an interface idea so good it ought to be stolen and widely used, this is it."

Memory Resident

You can pop Lucid up instantly while working in your word processor or any other program. You can cut anything on the screen and paste it right into Lucid, or cut anything from a Lucid worksheet and paste into the application below. You can even run Lucid on top of 1-2-3 if you like, and cut and paste information from one to the other, including formulas.

Notepad Behind Every Cell

Another 3-D feature is that any cell can also contain a multiple page note window that you instantly access with a single keystroke. You can write notes, memos or letters that relate to your work, save them as individual files and even print them separately or with your spreadsheet.

Other Features

Lucid has over 100 innovations that cause users to say it is the best of all the spreadsheet offerings! Things like: **Speed** - background, minimal and visible recalc. **Macros** - learning macros, autoexecute macros, macros work between spreadsheets, user defined macro menus. **Mouseability** - total Mac-like mouse access, but easy keyboard control as well. **Color or Mono** - 17 user controlled color displays. **Audit** - six displays and printouts. **Windows** - multiple sheets on screen at

same time. Multiple views of the same sheet. Pop-up windows of function formulas, range names, favorite labels, macro names, file-names, even a calculator. All let you select and insert right

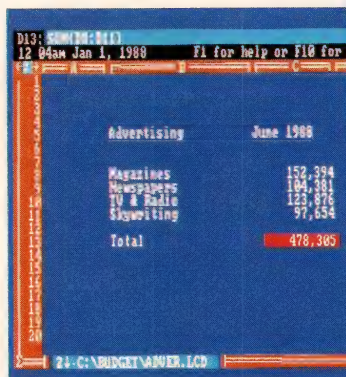


Fig. 2. Here we are instantly. Notice the lower left corner showing we are on level 2. Grey - takes you back. There is no limit to the levels you can go. Move right down to transaction level if you like.

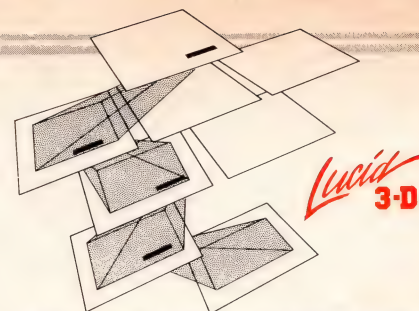
into your spreadsheet. All windows (even notes) resize and move where you want them. **Cut and Copy** - between spreadsheets, documents and between sessions. **Help** - press F1 anywhere, you get help specific to what you are doing.

Masterwork

Lucid is more than a bag of features. It is a masterwork. The overall feel is tight and polished. In fact, Paul Somerson, executive editor of PC Magazine, used one word to describe it, "Slick".

PCSG has built an excellent reputation as a developmental laboratory. Now those who have worked with Lucid 3-D tell us "you have done it again. This is software everyone should have."

Even if you don't plan to abandon 1-2-3, Lucid makes sense. Files are converted between them with ease so there's not



"The Best idea I've seen for a spreadsheet in years"

Jim Seymour, Columnist, PC Magazine, PC Week

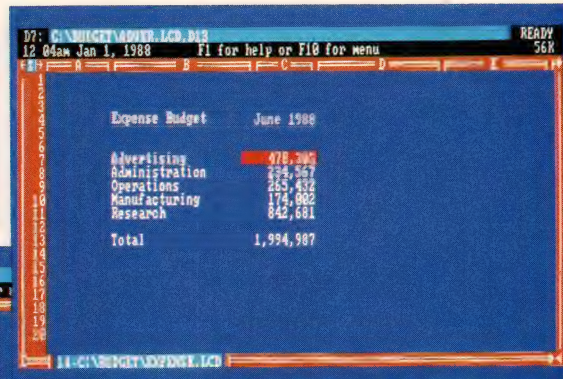


Fig. 1. Let's get the detail on those ad costs, just move the widebar to that cell and press one key (grey +).

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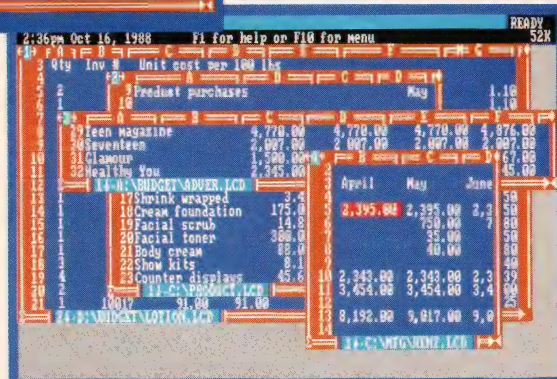
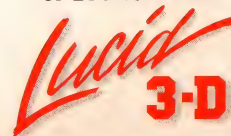


Fig. 3. Of course, Lucid does multiple windows. Notice, you can simultaneously open windows in different directories, different drives, even down as many 3-D levels as you like. No one else can do that.

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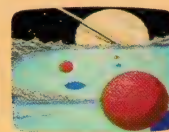
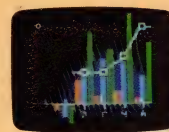
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Circle 66 on reader service card

IBM's Imperialism: Boon or Boomerang?

IBM's demand for retroactive royalties from PC
clone makers means only one thing:

bad news for Big Blue.



**David
Bunnell**

The way some American personal computer companies act, you'd think that Asian manufacturers of PC clones are just one step above international drug pushers.

In the 1880s some provincial Americans referred to the "Yellow Peril," by which they meant the thousands of Chinese who came here to build railroads and work in mines. Laws were passed preventing Chinese people (and later Japanese and Filipinos) from immigrating to, or becoming citizens of, the United States.

Americans today are not so blatant in expressing racism or national discrimination. We speak instead of "protecting" the U.S. market from cheaper foreign products, which more often than not are manufactured somewhere in Asia. A number of politicians have even made the "Asian invasion" a theme in their campaigns.

In the personal computer industry, we hear concern expressed about the flood of cheap PC clones from Taiwan, South Korea, Hong Kong, and Singapore. Now the People's Republic of China is slowly gearing up to tap the low end of this already low-end market. And pressure is mounting here to stem the tide of PC imports.

IBM's recent moves—licensing its patents for the PS/2 and demanding a retroactive license fee for patents on PC technology—are part of the great American surge toward protectionism. IBM is actually demanding that clone firms pay at least 1 percent of their PC revenues.

That maneuver came about after IBM apparently permitted Tandy and Dell Computer to develop their own PS/2 clones. IBM appears to have a cross-licensing agreement with Tandy that allows the Ft. Worth, Texas-based computer firm to produce PS/2 clones without paying royalties. And it also seems that Dell is paying either no royalties or at most very low ones.

Meanwhile, Compaq Computer announced it is setting aside money to pay IBM in the event that it is ever required to pay a licensing fee on the patents.

Clearly, IBM's demand for retroactive royalties is aimed right at the Asian clone makers. Those companies, which include South Korea's Hyundai and Daewoo and Taiwan's Acer Technologies, don't have cross-licensing agreements with IBM because they don't have the profit margins that would make such

(continues)

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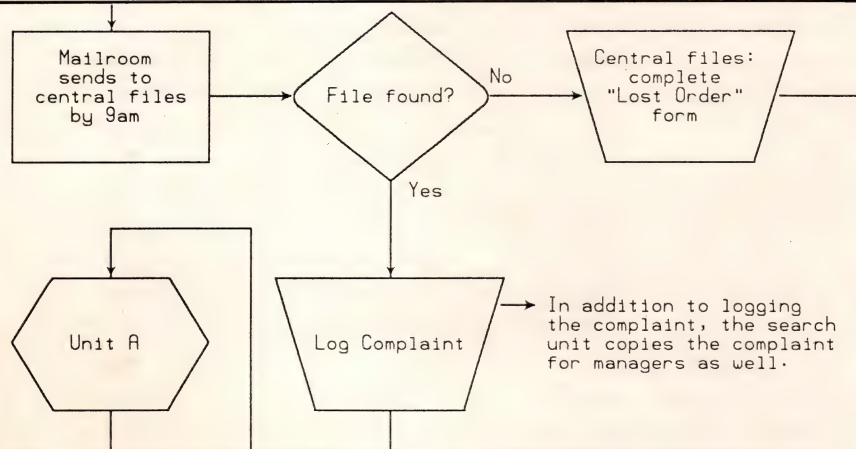
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* March 10, 1987 issue, page 278.

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agreements feasible. Instead, they play a low-cost, high-volume game.

In attempting to freeze the Asian players out of the personal computer market, IBM is making two mistakes. First, to the extent that it's behaving jingoistically, IBM is in danger of closing itself off from worldwide opportunities. This will certainly hurt the company in the long run, because the computer market is truly global, not limited to the United States.

Second, by assuming this seemingly antiforeign stance, IBM may inadvertently be validating those who believe that the PS/2, the Micro Channel, and the Presentation Manager may not be essential to life, liberty, and the pursuit of happiness. I'm beginning to hear foreign computer makers (and even some American firms) say things like, "The old bus is fine," and, "Maybe we can even create our own bus structure." Because of the very slow development of the PS/2 and the Micro Channel, Big Blue's push for retroactive royalties will backfire. There's no PS/2 steak yet; they can only sell the sizzle.

This whole exercise is an attempt by IBM to regain control of the PC market. But it may be too late for that.

As I see it, IBM would rather go after a company like Taiwan's Acer Technologies, which has been selling about \$500 million worth of clones each year, than do battle with Compaq or Tandy or another U.S. computer firm.

Naturally, IBM expects the U.S. business community and Stateside public sentiment to rally to its side. Instead of looking like a greedy monopolist trying

(continues)

The chart fragment above was produced on an HP LaserJet-Plus and is actual size and unretouched. Publication quality charts like this can be produced using only minutes of preparation time and seconds of print time.

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If you've been waiting around for a top performance, virtually zero wait state graphics card, here's some news you can't afford to take lightly.

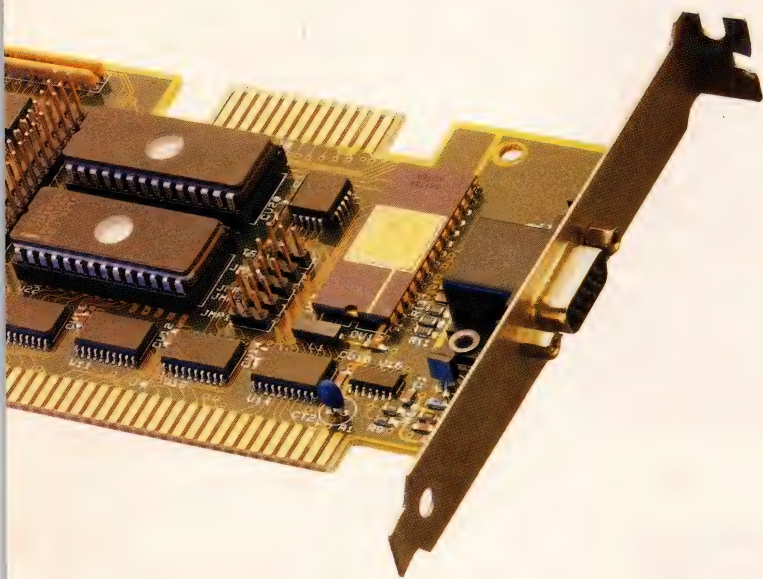
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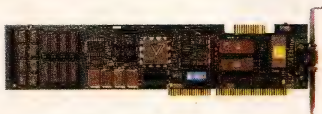
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to dominate the PC market, IBM can play the hero, safeguarding the interests of our economy against foreign interlopers.

The fact is, IBM really hates the clone makers, especially those in business outside the United States, for turning the PC into a worldwide commodity and seizing IBM's market-share "birthright." By resorting to such strong-arm tactics, IBM demeans its own role in the international computer marketplace. And ultimately, IBM is depriving American personal computer users of more affordable PCs—and of the right to choose the kind of system they want to buy.

So even though we all feel the effects of the international competition, in the long run only IBM is imperiled by yellow—or any other color—PCs. Its very shortsighted marketing strategy ought to change quickly. We'd all be better off. ●

POWER TIP NO. 1

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Jon Crowell
Eau Claire, Wisconsin

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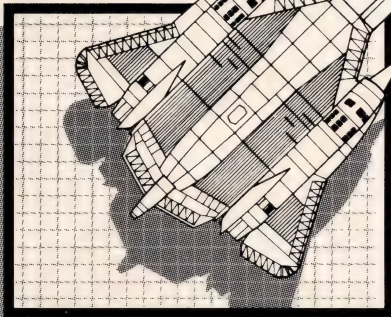
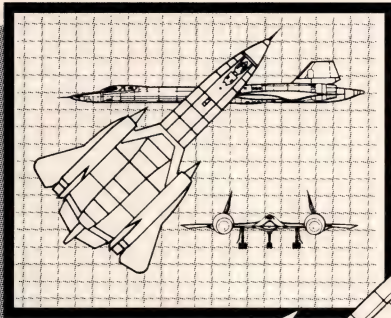
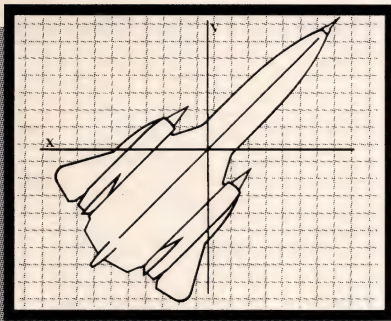
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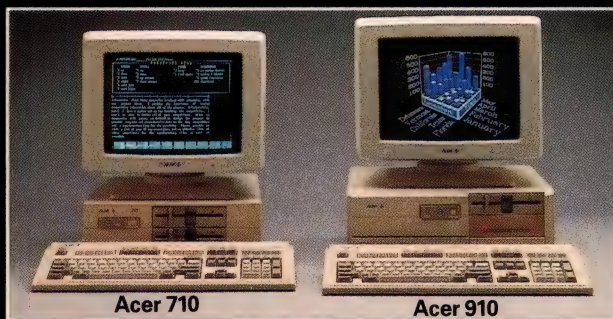
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LETTERS

Reactions and responses from the PC World community

When IBM Speaks...

In "A Few Minutes With..." [*Industry Outlook*, PCW, April 1988], William Lowe, president, IBM Entry Systems Division, is quoted as saying, "We're interested in encouraging applications that are compliant with the Systems Application Architecture [SAA], and we're happy to have other applications that aren't."

The last part of Mr. Lowe's quote seems to contradict the first part. SAA's success depends on the number of applications that follow it, and "happily" accepting applications that don't is not the way to reap the benefits of the consistent user interface SAA promises.

*Jerald Levinson
Kaunakakai, Hawaii*

Get It Straight, Please

In his column "Happy Birthday, PS/2" [*On IBM*, PCW, April 1988], William F. Zachmann writes, "Never mind that Compaq's Deskpro 386 blows away the PS/2 Model 80 on performance." Yet on page 164 of the same issue, a performance table comparing the Model 80, the Deskpro 386, and the Tandy 4000 shows the Model 80 to be as fast as or faster than the Deskpro 386. Am I missing something?

*Richard Allphin
Jamestown, Rhode Island*

Although the 16-MHz PS/2 Model 80-71 edged ahead of the Deskpro 386 Model 40 (also 16 MHz) in the NSTL performance tests whose results were printed in our April issue, Mr. Zachmann informs us that his remarks referred to the latest Compaq and IBM hot rods available at the time of his writing—the 20-MHz Deskpro 386/20 and the PS/2 Model 80-111. NSTL's January 1988 PC Digest tests of these last two machines show the Compaq to be significantly faster than the IBM. —Ed.

Smashing Windows

I just finished Robert Luhn's "Still Waiting for Windows/386" [PCW, April 1988], and I'm exhausted—from setting up and working *Windows/386* in my mind's eye. I groaned at having to sift through eight READ.ME files, moaned at losing system speed, got frustrated with the PIF files, cursed editing WIN.INI, and growled at the interface.

The review saved me the expense of purchasing *Windows/386* and wasting many hours of valuable time. Too many products wind up on the dust-collecting shelves as a result of reviews that only scratch the surface—for fear of offending a big advertiser. *PC World's* close look at (continues)

products is to be congratulated. Thank you for filling the gaps.

Bob Brody
Los Angeles, California

Through Microsoft Windows, Darkly

In the last several months the computer press has praised the OS/2 Presentation Manager. "This is the future of computing," we are told. One of the big benefits: The Presentation Manager will have *Microsoft Windows'* Macintosh-like user interface. That interface may be attractive and fun to use, but as a long-time *Windows* user, I can tell you we're in deep trouble if

the Presentation Manager is anything like its inspiration.

Every *Windows* application I have used has numerous bugs. Printing from *Windows* is painfully slow, and opening a desktop accessory is a tedious process. Why can't Microsoft include pull-down access to the utilities, as *GEM* and the Macintosh do? Saving desktop preferences is another missing capability—something that *GEM* and the Mac's Finder both offer.

If Microsoft wants success for *Windows*, much less for the Presentation Manager, it had better get the bugs out and reappraise the usefulness of the *Windows* interface.

OS/2 is IBM's vehicle to convince corporate America that its products are superior to those of other computer companies.

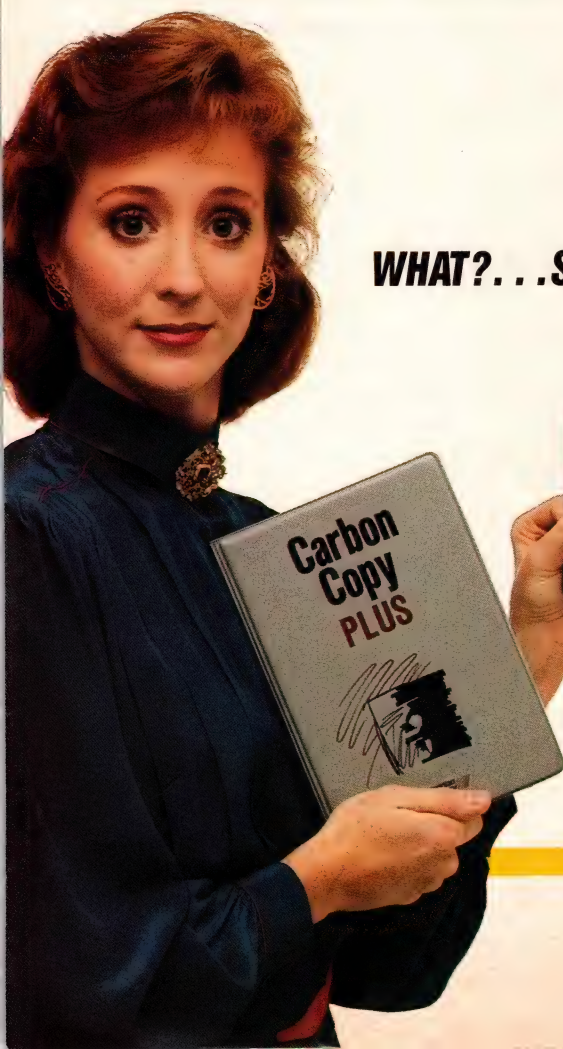
Based on what I've seen so far, the contest isn't even close.

Patrick John Ramsey
Dearborn, Michigan

New and Improved

Four years ago, I tried a year's subscription to *PC World*. Although your articles were filled with technical data, I didn't renew my subscription because product assessments weren't thorough and perceptive enough. I just didn't have the time to include the old *PC World* in my large stack of periodicals.

By chance, your April 1988 issue caught my eye, perhaps because of the line at the top of the



WHAT?...SOMETHING BETTER THAN CARBON COPY PLUS?...



cover that reads: "OS/2 Now" and "Windows/386." These are the topics for 1988. Inside, I was impressed with Mike Hogan's *Product Outlook* coverage of @Base for 1-2-3. Mr. Hogan understands the difference between spreadsheet and data base tools and, more important, that spreadsheets can be powerful tools for analyzing data bases. @Base is a kludge, but I agree that using such a tool for the job is still better than devising another monolithic 1-2-3 worksheet.

I like the new *PC World*. Keep up the good work.

Craig E. Dupler

Address Unavailable

Bring Back the Homespun Look

For the most part I like the new look of *PC World*. It's clean, easy to read, and makes good use of graphics and charts while retaining the well-written reviews and features that made me buy your magazine in the first place. A *PC World* article is like a good conversation—informative and humorous, but not pedantic.

What I don't like about the new design is the columnists' photographs. The informal head-and-shoulders shots have been replaced with serious full-length poses straight out of *GQ*. You look like a bunch of Republicans. I like to read your magazine, but please, lighten up the photographs.

Elaine B. Williamson
Anchorage, Alaska

Nice Threads

When I receive my copy of *PC World* each month, I always start by reading David Bunnell's editorial, followed by *Letters*, which, I must confess, has the same kind of appeal as an Ann Landers column. Folks, this is great reading; David, keep up the chatter. However, the real reason I'm writing is to tell you that the double-breasted suit you guys are handing around is real sharp, but it looks best on Zachmann. You should declare the suit a bonus and let him keep it.

Lee Patrick

Virginia Beach, Virginia
(continues)

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Circle 170 on reader service card

The Ultimate in Security

William Urschel's *Quattro* review ["Quattro Goes 1-2-3 Better," *PCW*, April 1988] inspired me to write about a problem I have encountered with the program.

I spent many hours building a confidential worksheet for my company, which I password protected by carefully following Borland's instructions. The first time I retrieved the worksheet, it came up fine, but subsequent attempts produced an error message stating that the password was incorrect.

A *Quattro* technician at Borland informed me that the com-

pany is aware of a password bug that sometimes introduces random passwords, even in non-password-protected worksheets. Although I don't doubt that Borland will eventually correct the problem, I can't help but wonder why they didn't warn registered users.

Mirko Najman
Los Angeles, California

A Devilish Business

Your recent "Buyers' Guide: Ventura Publisher and PageMaker Tools" [*PCW*, May 1988] lists Straightforward as a provider of downloadable fonts. The fonts and font support software offered by Straightforward were licensed from Mephistopheles Systems Design in an agreement

which has subsequently been terminated. At this time, Straightforward has no right or title to, interest in, or authorization to sell or license the sale of the listed fonts.

David W. Harralson
Mephistopheles Systems
Design
Hollywood, California

Rack of Ages

I enjoyed Michael Ham's review of *Zoomracks II* [*The Software Shelf*, *PCW*, May 1988], a program I use daily. I find *Zoomracks* useful for a wide range of applications—it's probably the last piece of software I would give up. Still, reading a review (*continues*)

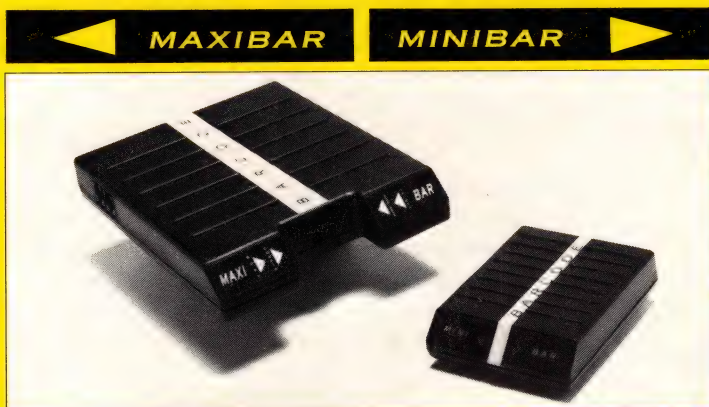
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focus helps track, prioritize, and schedule yourself or your people. It's an exciting new management tool that delivers confidence and control in what otherwise would be information overload.



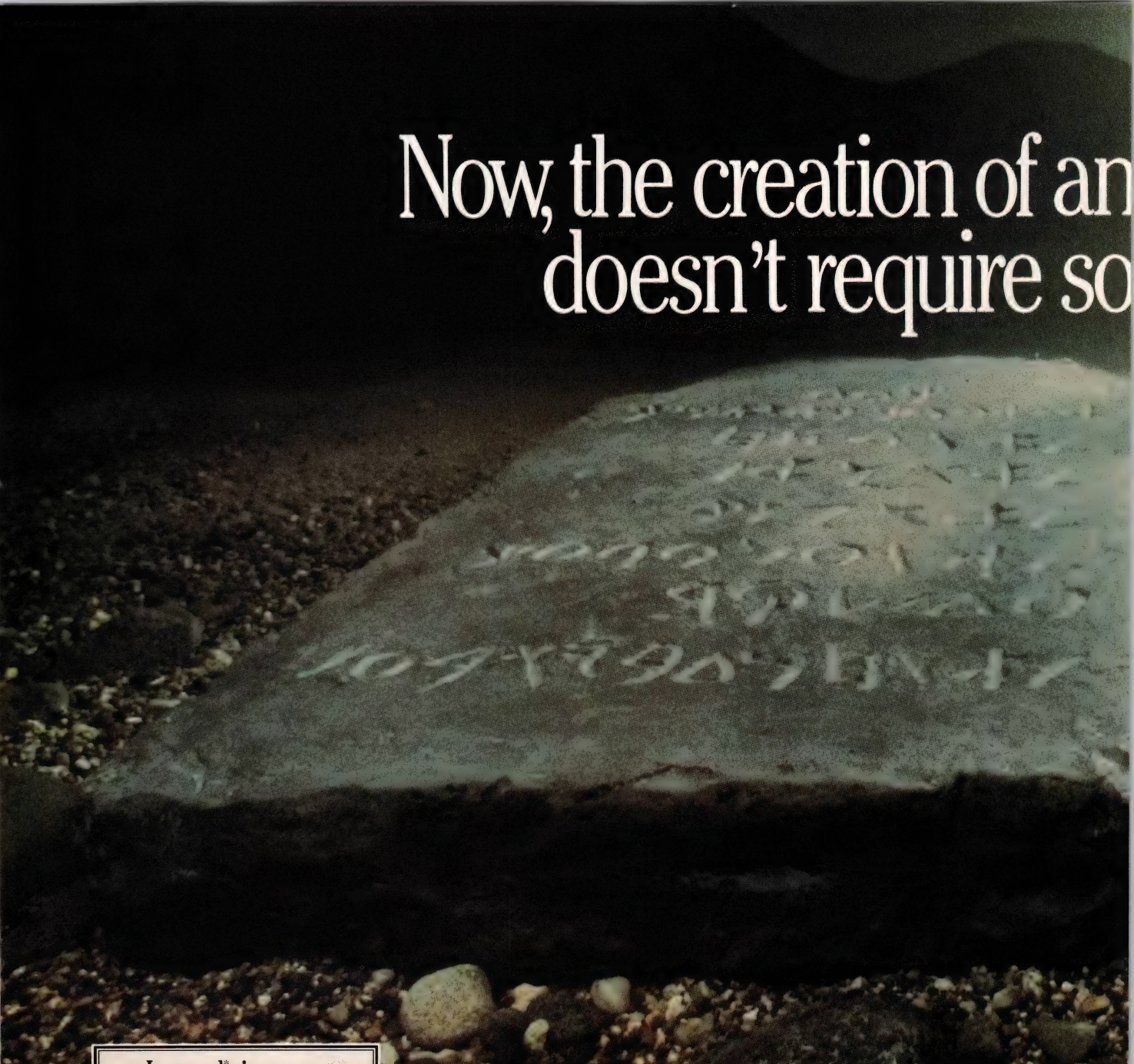
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Legend* gives you
word processing, graphics
and desktop publishing
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It used to take a miracle to get valuable documents produced. Moving in and out of different programs for different functions was no small feat.

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Legend vs. The Near Legends

	Legend	Near Legend	Legend	Near Legend
Year Founded	1978	1980	1978	1980
Circulation	100,000	50,000	100,000	50,000
Readership	100,000	50,000	100,000	50,000
Profit	\$1,000,000	\$500,000	\$1,000,000	\$500,000
Revenue	\$1,000,000	\$500,000	\$1,000,000	\$500,000
Assets	\$1,000,000	\$500,000	\$1,000,000	\$500,000
Liabilities	\$1,000,000	\$500,000	\$1,000,000	\$500,000
Equity	\$1,000,000	\$500,000	\$1,000,000	\$500,000
Debt	\$1,000,000	\$500,000	\$1,000,000	\$500,000
Net Worth	\$1,000,000	\$500,000	\$1,000,000	\$500,000

Figure 1

Information courtesy of A Legend

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of a program you've already purchased can be an exercise in remorse.

In this case Mr. Ham's review was balanced and fair, but it could benefit from a couple of clarifications. First, although *Zoomracks'* menu structure seems confusing, its menus, like 1-2-3's, become superfluous to the experienced user, and each command in the program can be invoked with a few keystrokes. Second, he states that the program's help command isn't context sensitive. Although the standard <F1>-invoked help file is not context sensitive, the <Shift>-<F1>-invoked file is.

Martin S. Brown
Walnut Creek, California

Graphics Adapter Clarification

Although we appreciate the mention of the Hercules Graphics Card Plus in your *WordPerfect 5.0 Preview* ["WordPerfect Desktop Publisher," *PCW*, May 1988], the article's description of our product was inaccurate. It states that users of a "Hercules InColor Card or Graphics Card Plus and a multiscan monitor" can view multiple font styles on screen during editing. In fact, the Graphics Card Plus is a monochrome display adapter designed to drive an IBM monochrome or compatible monitor only and does not work with most multiscan displays. We don't want our potential customers, the many owners of old monochrome adapters, to think they must buy

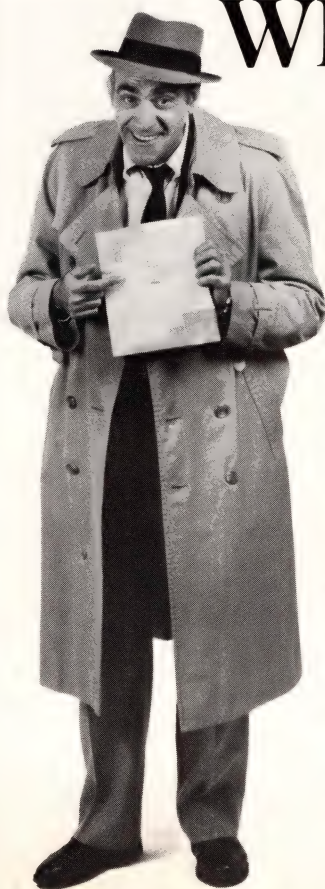
a new monitor to benefit from the Hercules enhancements.

Andrew Fischer
Director of Operations
Hercules Computer
Technology
Berkeley, California

Corrections

The Features Evaluation table that accompanies Patrick Marshall's *WordStar 2000* release 3.0 review (*The Software Shelf*, *PCW*, April 1988) contains an error. The "maximum header/footer lines" entries for *WordPerfect 4.2* and *Microsoft Word 4.0* should read *yes* rather than *deficient*.

(continues)



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Circle 47 on reader service card

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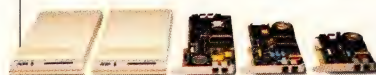
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Circle 179 on reader service card

Due to an editing error, the "PROS:" comments for David Weinberger's review of *Q-DOS II 2.0* (*The Software Shelf*, PCW, May 1988) incorrectly state that the program does not have a directory tree listing.

Lewis Perdue's review of the AST Hot Shot/286 (*The Hardware Shelf*, PCW, May 1988) is incorrect in regard to on-board memory-caching RAM and the function of the board's DIP switches. In fact, the Hot Shot/286 does have 16K of cache RAM, and readers should disregard the problems attributed to its absence. The board's DIP switches control what ranges of RAM addresses and ROM addresses are to be cached. *PC World* regrets these errors.

Letters should be mailed to Letters, PC World, 501 Second St., San Francisco, CA 94107, or sent electronically to MCI Mail PCWORLD/179-3813, CompuServe 74055,412, or The Source STE908. All letters must include the writer's name, city, and state and should not exceed one double-spaced typewritten page. We reserve the right to edit letters. ●

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You'll find one at the back of this issue.

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How Do You Improve On Perfection?

The powerful new release of WordPerfect, the world's No. 1 selling word

processor, would seem to be about as close to perfection as a product could come.

But even WordPerfect 5.0 is improved when it's run with Hercules RamFont (available exclusively on the Hercules Graphics Card Plus, InColor Card, and Network Card Plus).

Because RamFont lets you take advantage

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Small fonts, large fonts, still larger fonts and many other attributes can be generated with WordPerfect 5.0.

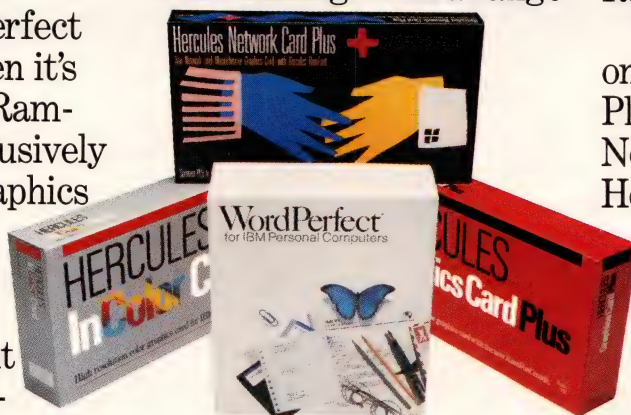
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WordPerfect 5.0 With Hercules RamFont

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Build Your Own Application

It's not as crazy as it sounds.

The right set of tools may make creating your own fully customized programs easier than 1-2-3.

It's an unfortunate fact of life that virtually no application comes ready to use right out of the box. As most of us have discovered somewhere along the line, a "timesaving" program can take so much effort to master that in the end it might have been better not to buy it at all.

That's not the way it's supposed to be. Personal computers became hot items in part because they promised to free people from depending on somebody else to write a program that got the job done. You'd think software developers would take the hint and produce applications that make it simple for average users to crank out work on their own terms. But as the author of this month's *Another Angle* testifies, that doesn't seem to be the case. Heavy-duty areas—data base management in particular—usually require a programmer to wrest the needed functionality from an application. Meanwhile, the average user waits.

So it's refreshing to see a few small companies trying to break this logjam by coming up with new ways for everyday users to tie their applications together into customized environments. Significantly, many of these products are being developed for

Microsoft Windows—but they're taking *Windows* places it's never been before.

Bridge/286 and *Bridge/386* are two good examples. Developed by a Cambridge, Massachusetts, company named Softbridge, these programs operate in a fashion no more intimidating than the DOS batch language. But like an environment-wide macro language (which *Windows* currently lacks), they allow users to integrate standard character-based applications such as *WordStar* with *Windows*-based programs such as *Excel* into a unified system designed for a specific task.

Bridge menus form a shell around applications, which helps the user treat these programs simply as tools to do a job—updating monthly sales figures, for example. With help from an experienced batch-file writer, a novice user can juggle multiple applications to turn out results that he or she could otherwise produce only after months of training.

Similarly, hDC Computer Corporation's *WindowsManager* provides a simple way for users (*continues*)



**Richard
Landry**

to treat applications as tools to do a job. By filling out fields and checking boxes in what looks like an enhanced *Windows* PIF Editor, users can tie programs into "sets" to be called up with a click on a menu. *WindowsManager* also adds another nice touch: a facility to install *Windows* programs like the Clock or the Calendar as Macintosh-like desk accessories that can be accessed from within any application.

In both cases, these products put the effort of learning an application in the background so that users can focus on specific problems in the foreground. If the little guys who created this software have the insight to help users leverage the power of a personalized workstation, then shouldn't the big guys be able to do it too? Maybe so.

Hewlett-Packard's *NewWave* environment permits users to tie *Windows* applications together in a far more ambitious manner than either *Bridge* or *WindowsManager*. *NewWave* blurs the boundaries between applications; instead of manipulating a spreadsheet or word processor or graphics program, *NewWave* users focus on the task of creating and editing *documents*. Click on text, and you're in the word processor. Click on numbers, and up pops the spreadsheet. Edit the numbers, and the graph automatically reflects the change. It's that simple. *NewWave* takes the concept of integration beyond anything PC or Mac users have seen before. Every document is its own customized *NewWave* environment.

The problem, of course, is that applications must be written

specifically to take advantage of the *NewWave* environment. So unless Microsoft and IBM adopt it as their own, *NewWave* may end up as yet another great idea that failed for lack of marketing muscle. Until Apple took out its corporate club and started whaling on Microsoft and Hewlett-Packard in court, it looked as though Microsoft just might incorporate *NewWave* technology into a future release of *Windows*, and perhaps into the OS/2 Presentation Manager as well. Now the future isn't so clear.

But it's small wonder that Apple reacted so vehemently to the prospective alliance. *NewWave* represents a way for PC applications to jump a couple of years ahead of those on the Mac. Here's hoping that the court finds a worm in Apple's suit before too long.

Given the state of application software, it's no surprise that a recent *PC World* reader survey revealed that almost 60 percent of you perform programming of some sort. Most of that is done in BASIC, but a large percentage of you use Pascal, and many program in dBASE as well. And this figure doesn't even include those of you who create 1-2-3 macros or use a general-purpose macro processor like *Keyworks* or *SuperKey*. What do these results reflect? Not that you're all churning out professional-level applications, but that you're hard at work turning your PCs into customized environments that boost your productivity and that of your co-workers.

To respond to your needs, we've added a new monthly feature geared specifically to in-house application developers.

Called Developer's Toolbox, you'll find it inside *Star-Dot-Star*, edited by Contributing Editor Tom Swan. Tom's an experienced programmer who's spent the last ten years helping users become proficient in languages such as Turbo Pascal. Each month he'll review one or more products aimed at increasing the productivity of in-house application developers. I hope you'll find Developer's Toolbox a useful addition to *PC World*.

As always, I'm interested in your opinions on this or any other subject. Write to me at *PC World*, 501 Second St., San Francisco, CA 94107, or send an MCI message to Richard Landry/301-3685. ●

POWER TIP NO. 2

DOS Redirection for Long Lists

To print a directory listing that spans more than one screen, use the DOS redirect function. The redirection symbol > channels output from DOS commands—such as DIR, CHKDSK, and TREE—to a printer or a file. To print a massive directory list, type DIR > PRN and press <Enter>. To create an ASCII file containing a directory listing, type DIR > filename and press <Enter>.

George Campbell
Los Osos, California

Next
in

PC WORLD

September

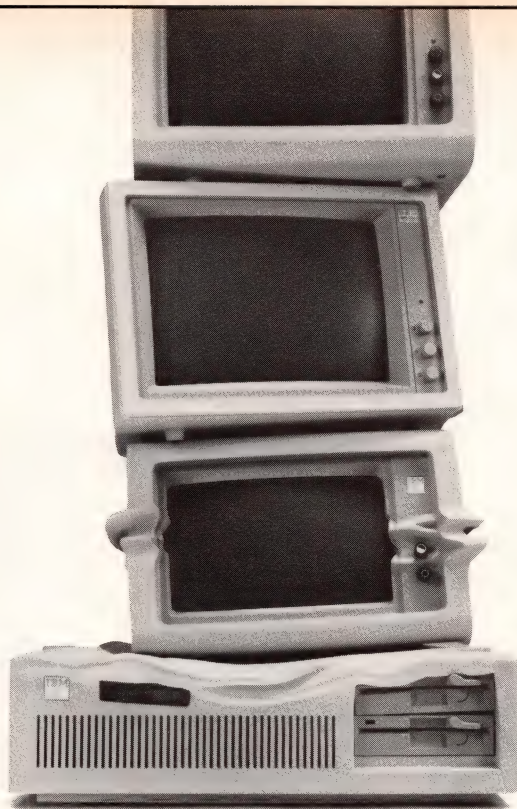
Business Survival

Nothing can make or break a company faster than its ability to manage its money and predict its cash flow. A PC-based accounting system is a coherent, protected, productive way to handle the lifeblood of your business—it may be the best investment you'll ever make. *PC World* evaluates the core modules of three popular, high-quality accounting packages for small to midsize companies.

24-Pin Salute

For cost-effective, all-around office printing at a fraction of the cost of a laser printer, you can't beat a 24-pin dot matrix printer. *PC World* takes a look at seven versatile machines that can whip out letter quality text and high-resolution graphics, with carbon copies to boot.

Plus, what every manager and business professional needs to know: How to make an informed decision about whether to buy or lease computer equipment for your office. And, how to buy spreadsheet templates that handle your tax, investment, and other financial needs.



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You know that overhead can kill you. In fact the terminal I/O overhead from just 4 Xenix users can seriously degrade performance of your AT-based system.

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"...Breakthru 286 is a good value and a quality product backed by effective support."

Dan A. Griffin
The Newsletter of the AutoCAD User's Group

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Ted Mirecki, PC Tech Journal (Rated #1)

"The 12-MHz Breakthru 286-12 speedup board is the fastest of those tested, but not the most expensive. On a dollar per-horsepower basis, it could be called the cheapest boost available for an XT."

Mark Welch, InfoWorld (Rated #1)

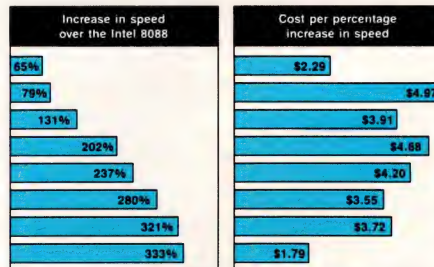
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Make Your IBM PC Faster Than an AT in Just 5 Minutes!

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Speed figures are consolidated results from 10 tests of CPU performance (See Accelerator Boards Special Report, December 1, 1986.)

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LIGHTNING™—FREE with Breakthru
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We are excited about our three speedup products. You probably know about our Lightning disk access speedup software that was awarded PC Magazine's Best of 1986 award (see box). After the smashing success of Lightning, in late '86, we

guaranteed the Breakthru 286 board to be literally the most advanced, fastest, most feature-rich board available. The runaway success it has enjoyed truly proved that assertion. Now we go ourselves one better with the Breakthru 286-12. This new board has the clock speed cranked up from 8 to 12 MHz for speeds up to 10.2 times faster than an IBM PC. It is 50% faster than an 8MHz IBM AT, and up to a whopping 1,000% faster than a regular PC.

HERE'S WHY THESE TWO BOARDS ARE SO SPECIAL.

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products it works in the Compaq Portable and most clones. Easy diagrams show how you just place the card in an open slot, remove the original processor and connect a single cable. There is no software required. From that moment you are running faster than an AT.

Second, they are advanced. The BREAKTHRU 286 replaces the CPU of the PC or XT with an 80286 microprocessor that is faster than the one found in the AT. Has a 80287 math coprocessor slot for numeric intensive applications. A 16K cache memory provides zero-wait-access to the most recently used code and data. Speed switching software allows you to drop back to a lower speed on the fly for timing sensitive applications.

Third, you have full compatibility. All existing system RAM, hardware, and peripheral cards can be used without software modification. Our boards operate with LAN and mainframe communication products and conform to the Expanded Memory Specification (EMS). Software compatibility is virtually universal.

Faster and smarter than an AT - PCSG guarantees it.

Fourth, these are the best. There are several other boards on the speedup market. We at PCSG have compared them all, but there simply is no comparison. Many cards offer only a marginal speedup in spite of their claims and others are just poorly engineered.

We are really excited about these products. PCSG makes the unabashed statement that the BREAKTHRU 286 card represents more advanced technology than boards by Orchid, Quadram, P.C. Technologies, Phoenix...we could go on. Breakthru 286 is undisputedly the turbo board with the biggest bang for the buck. And we include FREE the \$89.95 acclaimed Lightning software. Call today with your credit card or COD instructions and we will ship your card the very next day.

But, no speedup board cuts disk access time in half

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"Lightning is almost mandatory...." - Steve Manes, PC Magazine
Best of 86 review

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Circle 220 on reader service card



A Manifesto for the Future

**Computer users, stop buying the line that faster's
always better!**

**Stewart Alsop issues a proclamation about what
he'd like to see manufacturers really deliver.**

Just got yet another press release from yet another PC manufacturer proclaiming yet another speed record, this time for a machine sporting an 80386 processor that runs at a clock speed of 25 MHz. In the past three years, we have moved rapidly from 8088 processors going 4.77 MHz to 8086 processors going 6 MHz to NEC V20 processors going 7.8 MHz to 8088-2 and 80286 processors going 8 MHz to 80286 processors going 10 and then 12 MHz to 80386 processors going 16 and then 20 and now 25 MHz. This would seem to represent real progress.

They say that if a Rolls Royce were built by a computer manufacturer, it would get 100 miles to the gallon and cost \$4.95 (or something to that effect). Well, I'm not so sure. After six years, the computer industry is now offering us a machine that goes the equivalent of 100 miles an hour and costs about \$4000. I, for one, am bored by this accomplishment.

I've got a 16-MHz 80386 machine on my desk. DOS, 1-2-3, WordPerfect, and dBASE run like maniacs on that machine. But the fact is, I'm still using 1-2-3 (introduced in 1983), WordPerfect (introduced in 1984), and dBASE (introduced in 1982). All I hear about really neat new software like PageMaker, Excel,

Designer, Omnis Quartz, and Snapshot is how slow that stuff is and how it really takes a fast 80386 machine to make it work.

I got into this business because I was excited by the possibilities. But I'm getting tired of vendors telling me why it's going to take so long to get to those possibilities, particularly when they turn around and tell me how powerful and fast their iron is. In fact, there are plenty of ways for them to improve that have nothing to do with speed.

Operating system. I'm tired of waiting for IBM et al. to get their act together; I suspect that things are moving slowly on this front because of a raging lack of vision at the top. I want an operating system that includes all the goodies promised for OS/2—multitasking, memory protection, and automated communications between programs, to name a few—but I don't want it to compromise on performance. I also want its designers to aggressively prepare for new technologies, so that developers have standard specifications to support in those areas.

User interface. I'm singularly unexcited by early versions of Presentation Manager. From what I've seen, PM (as it is coming to be known) is a bare-bones (continues)



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Alsop**

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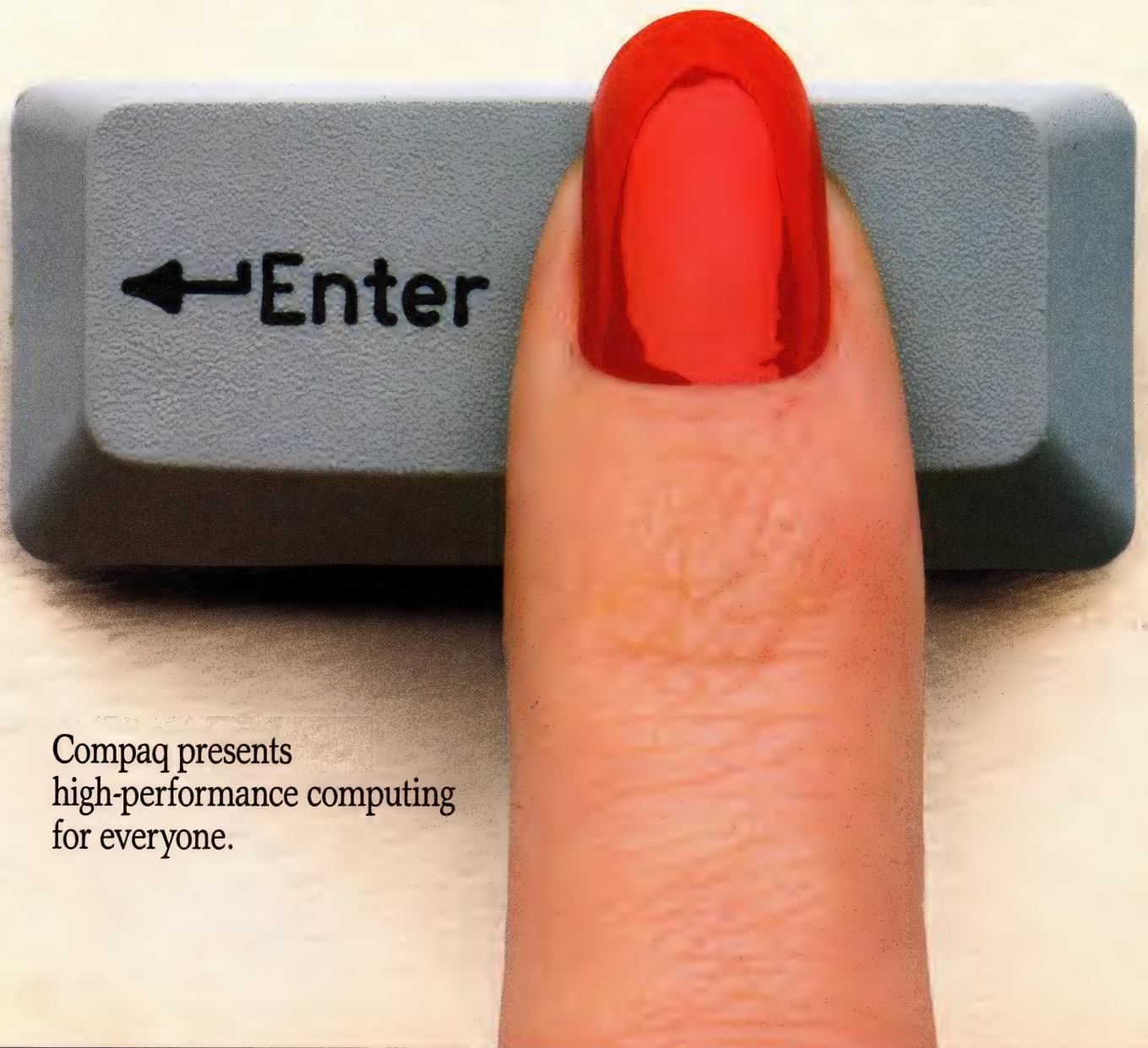
© 1988, Information Research Corporation.

user interface. Its file-management shell, for instance, not only breaks no new ground but also leaves out major features that were innovations in third-party DOS shells several years ago. How can you call a user interface easy to use when it still forces you to name files with eight characters, all in capital letters? How can you have a desktop metaphor where major elements of the desktop are missing? Call me dumb, but I thought the purpose of the desktop metaphor was to offer choices via familiar objects so you would know intuitively what to do without having to think about how the computer works.

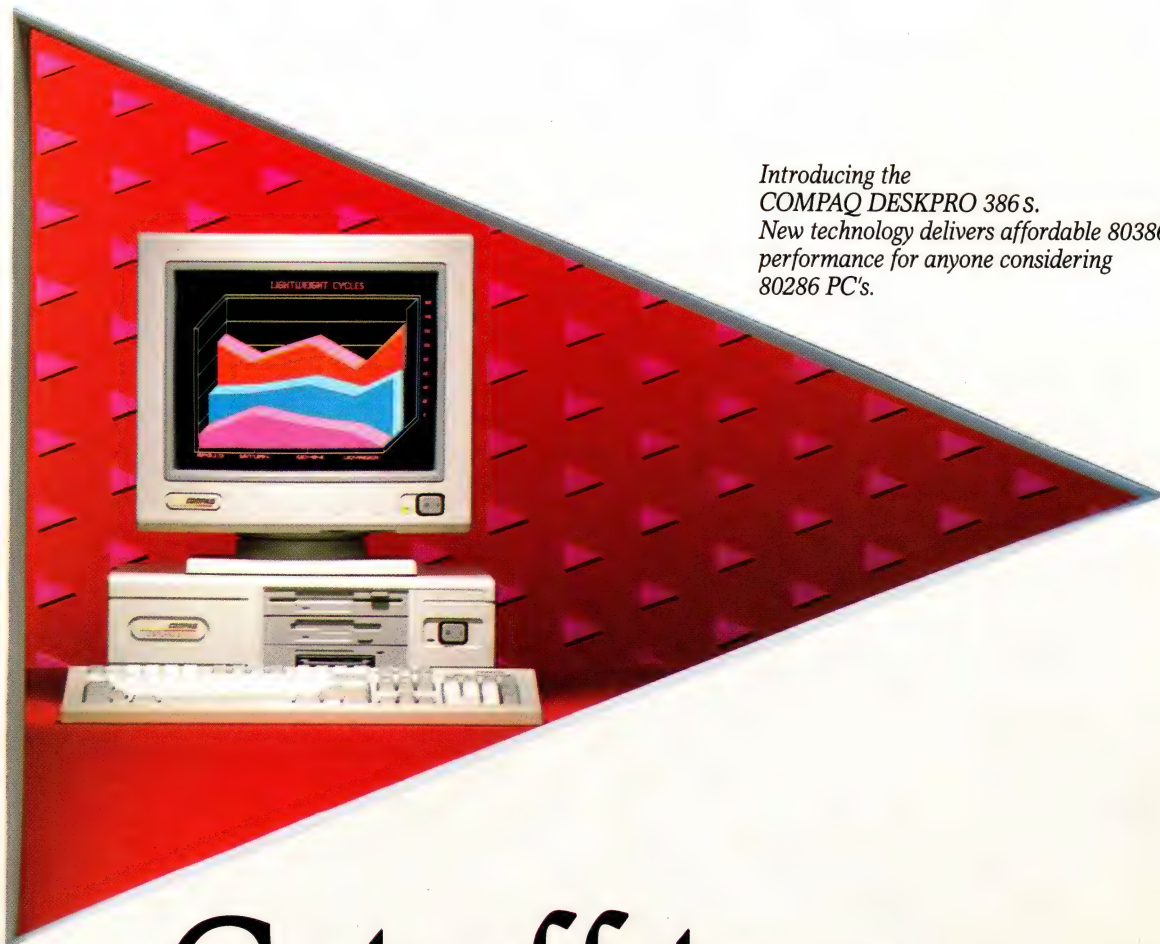
Graphics. On the surface, VGA graphics seem pretty snazzy. You get adequate resolution to display text alongside graphics. You get a one-to-one aspect ratio (finally) that allows you to display a square on screen that will actually print as a square, not a rectangle. In the primary graphics mode, you get 256 colors on screen out of a palette of 256,000. But first reports indicate that it's hard to get good performance out of VGA graphics running on an 80286 machine without any assistance. And basic, proven technology—in coprocessors, palettes, and system resources—allows manufacturers like IBM and its minions to provide much better graphics without much more effort.

Sound. You may think that little beep your machine produces is sound. It isn't. It's a miserable excuse for not giving more thought to the user. The applica-
(continues)

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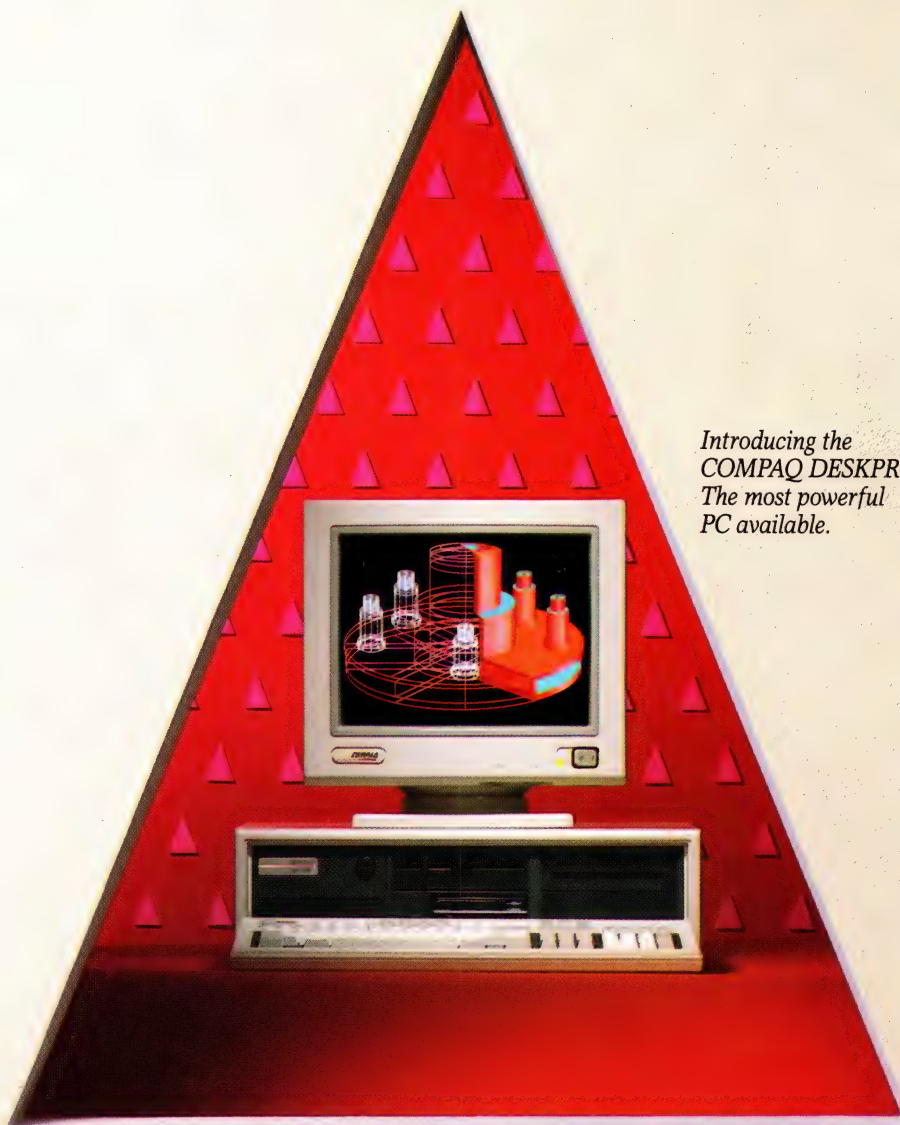
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STEWART ALSOP

tion of sound in computers is fairly primitive, but it's an area where major gains could be made to enhance ease of use and productivity. Imagine that when you deleted a file you had a choice of three sounds—breaking glass, the scream of somebody falling into a pit, or a pistol shot—to reinforce the dialog box that asked if you really wanted to delete that file. That might make you pay a little more attention when deleting files. Imagine also that when an OS/2 application was finished processing its task in the background, it actually said, "I'm finished, Stewart" in a voice that sounded like the HAL computer in the movie *2001*. None of that will happen until the computer has a built-in sound processor and the system software standardizes the way applications use the sound.

Networking. If your company is networked, with more than two or three work groups all bridged and connected, you may have noticed certain problems: For one, either you have to use the same electronic mail package as everyone else or you can't talk to the networks that use other packages. The reason is that networking personal computers is an exercise in the worst chaos ever foisted on unsuspecting computer users. IBM, for instance, appears to have favored token ring networking over ethernet, primarily because no one else had adopted the token ring and so IBM could control the specifications for it. Meanwhile, computer companies confront a choice of at least four ma-

(continues)



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jor networking schemes, all of which work differently and have different problems. In such chaos, even a major manufacturer with real insight won't be able to specify a standard way for electronic mail messages and addresses to be broadcast over dissimilar networks.

Communications. If you think networking is hard to understand, try getting your PC to talk to a mainframe or minicomputer (much less another PC by modem)—it's like to trying to turn an aircraft carrier around. But mainframe and minicomputer hardware and software developers are finally realizing that their commercial health and wealth depend on writing software that recognizes that PCs

are the primary way to communicate. Even so, PC users are usually forced out of whatever environment they're used to and into what's politely called "terminal emulation," which is really just an excuse so lazy programmers can avoid dealing with real users.

Product design. Last but not least (contrary to what most PC manufacturers would like to believe), it's time we got some decent product designers involved in developing personal computers. One great feature of IBM's PS/2 models is that they don't require screwdrivers or other tools to disassemble. But compatibles and peripherals makers have to get their act together. If I encounter one more monitor, printer, modem, or cable that requires me to pull out my tool set to detach it, I'll scream. It

doesn't cost any more money or take any more time to provide a screw with ridges on the head that you can tighten with your fingers. And it certainly would make life easier.

So that's it, a manifesto for what I expect from manufacturers. When I read a press release from a manufacturer that claims its machine actually does something new, instead of just doing the same old thing even faster, then I'll sit up and take notice. And I suspect I'm not alone in that regard. ●

Stewart Alsop is editor and publisher of P.C. Letter and a contributing editor for PC World.

THIS ISSUE'S HIGHLIGHTS

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Gross Sales	18,780	19,874	19,455	19,845	20,241	20,646
Less: Returns	324	330	681	452	461	478
Less: Sales Discounts	268	273	279	284	298	296
Net Sales	18,188	18,470	18,496	19,108	19,498	19,888
Cost of Goods Sold:						
Beginning Inventory	1,243	1,219	1,376	1,444	1,512	1,583
Purchases	1,521	1,591	1,517	1,543	1,579	1,598
Transportation	344	373	381	388	394	412
Less: Purchase Returns	857	9,944	9,225	9,413	9,378	9,381
Goods Available for Sale	8,187	8,351	8,516	8,689	8,829	9,029
Less: Ending Inventory	9,921	10,115	9,978	10,420	10,628	10,841
Gross Margin	1,267	1,255	1,518	1,519	1,570	1,547
Selling Expenses:						
Sales Force Expense	1,348	1,285	1,311	1,337	1,364	1,391
Advertising Expense	629	632	645	659	671	685
Freight Expense	250	254	271	281	287	295
Delivery Expense	180	184	187	191	195	199
Building Expense	140	143	146	149	152	155
Other Selling Expenses	89	82	83	85	87	88
Total Selling Exp	2,540	2,531	2,645	2,695	2,749	2,804
Development Expenses:						
Engineering Salaries	120	122	125	127	130	132
Lab Supplies	80	82	85	87	89	91
Contracted Engineering	22	23	25	27	28	29
Building Expense	31	32	33	34	35	36
Other Expenses	31	32	33	34	35	36
Total Expenses	311	319	326	332	339	346
Administrative Expenses:						
Salaries and Benefits	848	877	895	913	931	950
Occupancy Expenses	180	110	112	115	117	119

Unretouched photo of EGA display.

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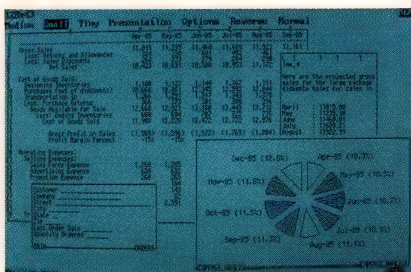
– Lotus Magazine

"I use SeeMORE almost constantly."

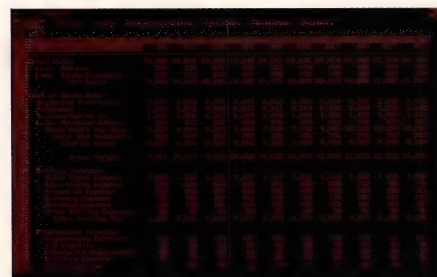
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Small	106x33	128x43	106x48	120x43	128x50
Very Small	128x25	150x51	128x53	144x43	N/A
Tiny	128x33	160x58	160x60	180x58	160x66
Presentation	40x25	40x25	40x34	45x25	40x28

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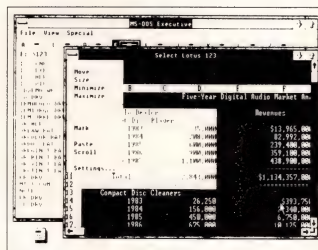
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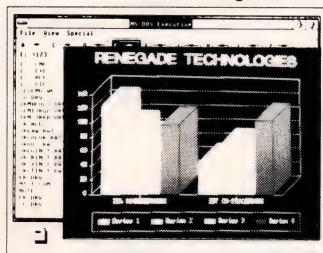
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UR MOTHER

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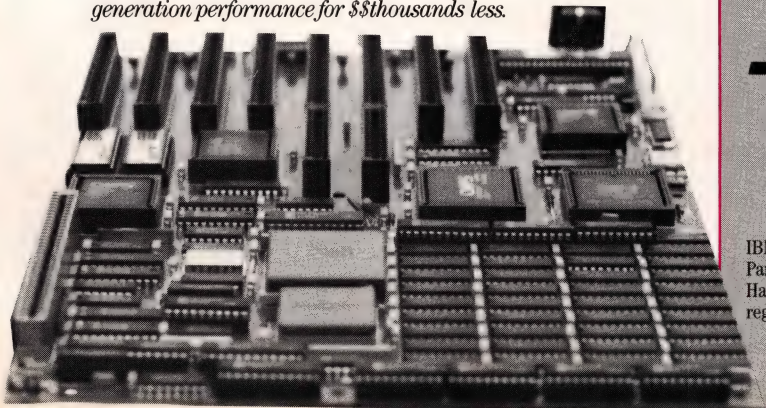
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Toshiba's 6.4 Pound T1000 Is the Lightest Laptop Yet

HANDS ON

BY HOWARD MARKS

Big advances have been made in DOS-compatible laptop computers in the last year. Back lighting and supertwist LCDs have made screens sharper than ever, miniaturized hard disks from JVC have expanded stor-

with the programs on your desktop computer.

Toshiba America, which had a lot to do with this laptop revolution, is bucking the trend. Its new T1000 sacrifices a few of the amenities we've come to expect from new laptops but delivers the essentials in a sturdy 6.4 pound package.

There's no

But the T1000 is a case of less being more. The design is brilliant. DOS is stowed on a ROM chip for instant booting. The 12 1/4- by 2 by 11 inch package fits in an ordinary briefcase. It runs on a charge for 5 hours and can keep a

light, portable computer.

A couple of pounds heavier than Tandy's Model 100, its far more powerful.

Of course, Toshiba was under pressure to come up with something. A tariff imposed by the government

LAN Magazine

A Major Technological Feat. There Is Nothing That Comes Close To The T1000.

By Harry Newton

This is another one of my biased test drives. I like this product. I use it. I am writing this test drive on it, sitting in bed. It is one gorgeous luxury. The T1000 is the lightest PC-compatible laptop I've ever used. It's 6.4 pounds (in case you're not fully loaded).

BYTE

JANUARY 1988

THE MOST PORTABLE IBM PC-COMPATIBLE COMPUTER I'VE EVER USED.

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PC WEEK

T-1000 Lap-Top: Light, but No Featherweight in Performance

By Stephen Sagman

To fashion the extraordinarily small T-1000 lap-top computer, Toshiba engineers took their best-selling T-1100+ lap-top, miniaturized everything they could and scrapped the frills.

What they came up with is a featherweight. It's a little bigger than a briefcase, but it weighs less than a book to carry back to the office.

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The OS/2 Presentation Manager and Its Rivals

The graphic user interface is the game of the future.

Does IBM's Presentation Manager have what it takes to win, or are other players gaining on Big Blue?

The most important struggle among computer vendors today is the battle to define the user interface for the business user. Personal computers are going to be the "front end" even for enterprise-wide systems. Controlling the definition of that front end will give a vendor powerful advantages in the future.

Almost everyone agrees that the winner will be a graphic user interface. That means that the present command-line interface of PC-DOS and MS-DOS will be replaced over the next few years. The critical question for IBM is whether it can establish the OS/2 Presentation Manager as the dominant alternative.

The Presentation Manager in OS/2 1.1 is the focus of IBM's effort to bring the ease of use of a graphic user interface to the desktop. The Presentation Manager is also a key element of IBM's Systems Application Architecture; it is the foundation of SAA's common user interface.

The Presentation Manager is not without rivals, however. Apple Computer, first with the Lisa and then the Macintosh, has offered a graphic user interface for over half a decade. The Macintosh's consistency among applications plus its ease of learning and ease of use has made it wildly popular with several million users.

From another quarter, Sun Microsystems and AT&T are offering Open Look. This powerful graphic user interface is built on top of a UNIX System V. It was developed under an agreement with Xerox—in fact, much of the original R&D for the modern graphic user interface was done at the Xerox Palo Alto Research Center in the 1970s.

In addition, there are various versions of *Microsoft Windows*, which is the basis of the OS/2 Presentation Manager as well as the foundation of Hewlett-Packard's *NewWave*. These versions offer yet another alternative to the Presentation Manager for those who don't want to incur OS/2's overhead costs. Still other contenders include Digital Equipment Corporation's *DEC Windows*, DRI's *GEM*, and even character-mode alternatives like Tandy's *DeskMate*.

A graphic user interface requires a high-resolution graphics adapter and monitor, making it possible to display both text and graphics. Combined with the appropriate printer or other output devices, basic graphics capabilities open the door to applications such as desktop publishing that are difficult if not impossible to (continues)



**William
F. Zachmann**

use with older systems that have character-based displays.

The key to the importance of graphics capabilities, however, is that they give the user an easier way to understand, learn, and interact with the computer.

The point of entry for the user of a graphic user interface is a cursor-control device (commonly a mouse), which permits direct manipulation of the screen. Rather than having to tell the computer what to do, the user simply picks from choices displayed on the screen.

By making it easy for the user to act, the graphic user interface greatly reduces the need to remember, for example, special function-key or <Ctrl>- or <Alt>-key combinations required for particular actions.

Since applications for a graphic user interface conform to common ways of doing things, considerable consistency across different applications is possible. Common actions include cutting and pasting text or graphics, saving and retrieving files, and getting help. The user, facing a new application, thus already knows how to do these things.

But all graphic user interfaces are not alike in their potential benefits, and all users are not alike in what they want from their system. For many experienced MS-DOS users, for example, a graphic user interface may at least initially be uncomfortable. People who know DOS well and who readily think in terms of commands, files, and directories may feel that a graphic user interface makes it more difficult to do the things they used to do.

There are limits to what the graphic user interface can do, too. Word processing, for example, requires that the user cope with the keyboard, no matter how helpful the mouse may be for certain things. A complex data base remains complex whether or not the user relies on the graphic user interface. And the cost of any graphic user interface system is high—a barrier for many people.

Yet even for the MS-DOS power user, eventual migration to a graphic user interface is almost guaranteed by the much wider range of applications it makes possible. But with so many different and incompatible candidates vying to become the definitive standard for the graphic user interface on the desktop, can we automatically assume that the OS/2 Presentation Manager will be the winner? Is IBM's strategic effort to make it the standard sure to be successful? Or will one of the other contenders emerge victorious?

The answer, quite simply, is that barring a major catastrophe in Microsoft and IBM's development efforts between now and the end of the year, the OS/2 Presentation Manager is virtually certain to become the standard graphic user interface for business users. The Presentation Manager offers all the key benefits of the graphic user interface to the dominant world of IBM and compatible systems and will unquestionably draw the great majority of those systems' users. Ultimately, the graphic user interface represented by the Presentation Manager and *Windows* will dominate because of the sheer power of IBM and Microsoft: They simply can't be beat.

Apple's Macintosh has done very well by being the first product to offer a graphic user interface at an affordable price. Still, it is a proprietary environment, and the economics of trying to make it a multivendor standard just don't work in Apple's favor.

And Apple's advantage of being the only game in town is fast disappearing. Unless the U.S. court system has gone completely mad, Apple's legal fantasies about owning the graphic user interface haven't a chance.

While Apple will certainly continue to maintain a significant minority share of the market, the OS/2 Presentation Manager is a far more logical migration path for most current PC-DOS and MS-DOS users. What's more, its linkage to the other features of OS/2 that enable major application development on micro platforms will make it the dominant choice for most corporate users.

UNIX-based alternatives, whether AT&T and Sun's Open Look or UNIX windowing graphic user interfaces from other sources, are also unlikely to claim more than a minority segment of the market. While they have a strong base in the scientific and technical areas and are likely to make some inroads into the office, they are no more likely to displace OS/2 than is Apple's Macintosh.

The primary problem with UNIX is in defining a single alternative to the OS/2 Presentation Manager and getting everyone to agree to it. Other UNIX vendors have opposed AT&T and Sun's efforts to define the standard with Open Look. All of this

(continues)

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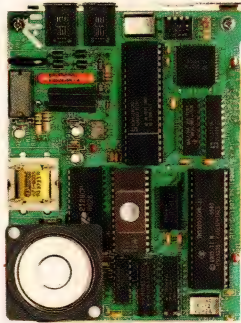
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Exit - transmit file to MIRROR or Crosstalk system

Blocksize - specify block size used by Exit

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Xmodem - transmit file using XMODEM protocol

Crc - if on, use CRC error detection in XMODEM

Xmodem - receive file using XMODEM protocol

Xmodem - transmit file using XMODEM protocol

Batch - receive files using XMODEM multi-file protocol

Xbatch - transmit files using XMODEM multi-file protocol

Kermit - receive file using Kermit protocol

Xkermit - transmit file using Kermit protocol

Gkermit - get a file from a Kermit server

Kermit - specify Kermit defaults

Rhayes - receive file using Smartcom II protocol

Xhayes - send file using Smartcom II protocol

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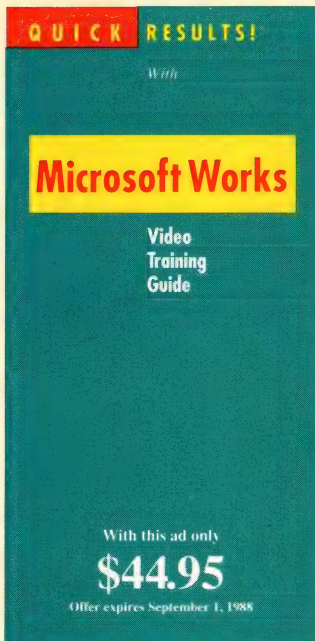
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serves to confuse users about UNIX alternatives and to delay software development.

In fact, UNIX's best chance to win a significant place on office desktops may well be to implement the OS/2 *Windows* Presentation Manager over X/Window. Otherwise, chances that a UNIX-based graphic user interface will become the dominant standard are slim.

Other options from individual vendors, DEC in particular, may succeed within their installed base. There is little or no chance, however, of these being anything other than niche options.

The one serious competitor of the OS/2 Presentation Manager over the next couple of years will be Microsoft's own *Windows*. *Windows 2.03* and *Windows/386* offer a user interface that is effectively identical to that of the Presentation Manager without requiring the substantial system resources that OS/2 demands. Cost also will help determine whether IBM's OS/2-based Presentation Manager or Microsoft's DOS-based *Windows* will prevail.

Until powerful Intel 386-based (or 486-based) systems with upwards of 4MB of memory and at least 60MB or 70MB of disk storage are readily available in the \$2000 to \$3000 range, the majority of users just won't be able to afford systems capable of running OS/2 and the Presentation Manager with satisfactory performance. In the meantime, *Microsoft Windows* will provide the best way to benefit from a graphic user interface on an inexpensive MS-DOS system. ●

William F. Zachmann is senior vice president at International Data Corporation.

INDUSTRY **IO** OUTLOOK

Edited by ERIC BENDER

Sales, Profits Just Keep Rising

Microsoft Rolls Ahead on All Market Fronts

Pushing Into OS/2 Networking



RICH FISHMAN

As PC sales boomed, everything came together for Microsoft, remarks president Jon Shirley.

How can a software house so big keep growing so fast?

As it races past the \$600 million mark, Microsoft is extending its lead as the largest independent vendor of microcomputer software. And profits are more than healthy—in fact, the Redmond, Washington, giant *earns* more than Borland International *sells*.

President Jon Shirley cites three reasons why sales and income both soared by more than 60 percent during the past year. First, "The number of machines sold is outdoing everyone's expectations." Second, Microsoft

began unleashing a barrage of new products in the second half of 1987. Third, there is increased market share for existing products: "With *Word*, for example, every version [has produced] a notable improvement in penetration.

"We've had all of those things going for us at the same time," says Shirley.

DOS, the archetypal money mill, runs on more than 20 million machines worldwide; and lately, IBM has led the development work. "One of the big goals for DOS is not to have any divergence between what IBM sells and what other manufacturers sell," Shirley explains. He adds that DOS is not

going to roll over and die now that OS/2 is appearing. Outsiders expect a major upgrade this summer with ease-of-use enhancements and improved disk partitioning.

Although the *Windows* operating environment presents far from a similar success story, Microsoft has shipped almost 2 million copies and stands firmly behind the product. *Windows* is "not a static product," Shirley says. "We will address a number of key issues—make it easier to install, help with memory requirements, and increase the speed and performance."

The firm's big guns are trained on OS/2, though, and Shirley claims a great deal of support from the development community. Standard Edition 1.1, with the Presentation Manager interface, is on schedule for October delivery. Naturally, Microsoft emphasizes OS/2 network products as well. "Our fastest growing internal group in terms of people is our networking organization," Shirley says. He expects the first offering, the LAN Manager, to be "a major contribution to our business."

Languages remain a key market; this year Microsoft has released OS/2 versions of its standard languages and is moving toward releases for the Presentation Manager. The company does not currently plan to introduce new languages but is very interested in *(continues)*

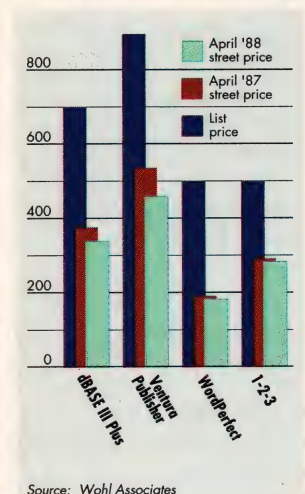
UNIX Tries to Turn Professional

Sun's Desktop Turns On the Heat

Will AT&T's veteran UNIX operating system quietly capture millions of desktops where DOS now reigns supreme?

"UNIX is going to be a major player on the desktop, in all markets and in all applications," declares Scott McNealy. "Don't cede the desktop to OS/2 *(continues on page 76)*

Software Street Pricing



Source: Wohl Associates

Many resellers give hefty discounts for popular application packages, but most street prices haven't dropped significantly in the past year, Wohl Associates research shows. Prices do dip just before a major update appears, as Ashton-Tate's dBASE is currently demonstrating.

Color Thermal Printers Carve Out a Niche

Heating Up the Printer Market



MARC ROSENTHAL

Sure, that VGA monitor sitting on your desk looks plenty impressive. But a color monitor is something of an island—it still may lack a practical way to translate screens into hard copy output.

Although color laser printers are beginning to appear on the market, their prohibitive price (\$25,000 and up) remains beyond the budgets of most users. At the other end of the spectrum, the Hewlett-Packard PaintJet costs only \$1595 and fills some jobs, but it lacks resolution and speed.

Color thermal-transfer printers, however, are emerging as an attractive alternative. For anywhere from \$4000 to \$10,000, you get output suitable for professional presentations.

William Coggs, president of Desktop Presentations, a research firm in Mountain View, California, predicts that

20,000 color thermal-transfer printers will sell this year and four times that many by 1992.

"When you consider their combination of cost

Microsoft

(continued)

low-end products like Quick C.

Microsoft's business applications, currently headed by *Word* and *Excel*, start with one low-end product, *Works*; the rest are in-depth productivity applications. Microsoft won't add versions for large multiuser computers, but Shirley acknowledges that as networking arrives, "there's a natural progression from tools aimed at the individual to tools aimed at a group—for example, in document preparation."

Microsoft began pursuing foreign markets in the early 1980s, and its overseas offices are all staffed by local people. It does

and quality, you see that these printers are quickly becoming a potent solution to the need for color hard copy," says Stanley Klein, editor of the *S. Klein Newsletter on Computer Graphics* in Sudbury, Massachusetts.

Color thermal-transfer printers apply color to paper by means of a heated printhead. Working one line at a time, the printhead melts color inks stored in a wax-based "inksheet" that is pressed against the page. Most inksheets contain four colors (black, blue, magenta, and yellow) that can be blended to create literally millions of different hues. Resolution varies from 150 to 300 dots per inch; throughput typically ranges from one to three pages per minute.

Thus far, the market has been dominated by Ja-

panese suppliers. Coggs shall ranks the top five players as Seiko, Mitsubishi, CalComp, Panasonic, and Tektronix.

Though prices are falling, color thermal-transfer printers do require fairly expensive supplies. And far too few software packages properly support them, Klein says.

Coggs shall predicts that the printers will have a limited life span as the color output device of choice. Eventually, color laser printers, which will be faster and cheaper to operate, will come down in price. "But they're really quite a few years away. Before color laser printers became widespread, we'll first have to see color photocopiers become accessible."

—Daniel Brogan

48 percent of its business overseas, "and if you consider the number of machines sold around the world, that's what the percentage ought to be," Shirley says. (But few micro software firms match that figure; Lotus, for example, sells 33 percent of its products abroad.)

With more than 2500 employees worldwide, one of Shirley's biggest headaches is finding room for everyone. Another is finding management talent, but promoting from within the ranks has paid off, he feels.

Industry analysts may speculate about sluggish acceptance of OS/2 and the effect of Apple's law-

suit over *Windows*. But Shirley sees a positive future for OS/2. And, he says, "so far, the impact of the Apple suit has been fairly minor. If there were long-term uncertainty, that would hurt us—and the longer it went, the more it would hurt."

Shirley sees two areas of potential vulnerability. First is that Chairman Bill Gates remains irreplaceable, particularly as technology visionary. Second is Microsoft's relationship with IBM, but Shirley claims that "it's never been better." Overall, he says, the future looks bright: "We think we have a good vision of where the industry is going and what our place will be." —E. B.

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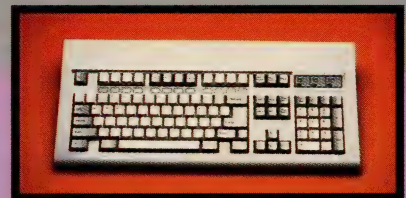
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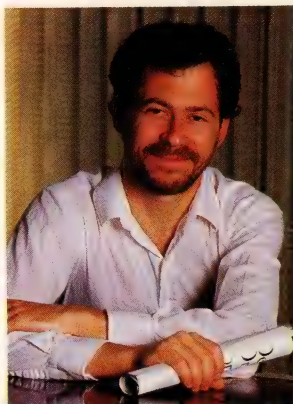
Z-Soft Adds Graceful Grays

As PCs transform themselves into ever-more-dazzling graphics engines, the business challenge is to convince users of the real benefits of driving those engines. As software pioneer Z-Soft crosses into new territory and reaches for a larger audience, it's turning to a big partner, Mediagenic, for marketing and distribution assistance.

Z-Soft already claims more than 900,000 users for *PC Paintbrush* and its descendants. In the past year, the Marietta, Georgia, firm has found a home in graphics for desktop publishing and is grabbing fresh opportunities with gray-scale support and design-your-own-font capabilities.

This leading-edge technology comes from a startup that began on the flimsiest of shoestrings. Chairman Mark Zachmann, 33, quit his teaching job in 1983 to try his hand at paint packages. "I took all the money I had in the world, which wasn't a lot," he recalls. His fledgling firm grew slowly, working out of Zachmann's basement until early 1985. "The neighbors were sure we were smuggling drugs."

PC Paintbrush spun off *PC Paintbrush Plus*, whose added features include the ability to run scanners directly. Desktop publishing addicts eagerly snapped up this new package but complained about working with only a



PCs with gray-scale support are racing toward print shop quality, says Z-Soft's Mark Zachmann.

fraction of a full, bit-mapped, 300-dpi page. *Publisher's Paintbrush*, released in early 1987, addressed this concern with "zoom-out editing."

Last September, *PC Paintbrush Plus* and *Publisher's Paintbrush* became the first PC packages exploiting shades of gray to improve images on screen and in hard copy output—heralds of a radical expansion for desktop publishing.

PS/2-style analog monitors provide good examples of the excellent image quality that gray-scale technology can furnish at a reasonable price. And, Zachmann points out, gray scaling gives you much greater control over the image. For instance, if you scan a photograph and create a standard black-and-white image and then resize it, the result can be ugly, because

the scanned patterns of black dots just aren't arranged for the new size. A gray-scale image, which holds a lot more information, looks much more like the original. This approach does require massive amounts of memory and an expensive typesetter, although Zachmann expects to see gray-scale laser printers within two years.

Publisher's Type Foundry, which debuted last year, is a unique tool for conjuring up typographic fonts. "I expect a year to pass before anyone understands what it does," Zachmann says. Then, he thinks, the package will become a basic desktop publishing tool.

As Z-Soft adapts its product family to work with OS/2's Presentation Manager, "we're also significantly changing our philosophy when it comes to the *Paintbrush* family," Zachmann says. Today the paintbrush is a familiar symbol, "but there's trouble with features like

the color eraser, because that doesn't exist in nature," he says. Upcoming offerings "will offer a raft of tools that you just don't use today."

Z-Soft employs about 40 people, and it has always been profitable. *Soft-letter* estimates 1987 revenues at \$4.4 million.

But can a small, feisty firm compete when giants like Lotus muscle in? No, Zachmann says, not in the long term, not without some major help. "In three years, this will be a big boys' game, and there's nothing we can do about that."

Thus Z-Soft agreed in May to be bought by Mediagenic, formerly Activision, a Mountain View, California-based firm roughly ten times Z-Soft's size and known primarily for entertainment software. Zachmann expects Z-Soft to remain an independent subsidiary and exploit Mediagenic's distribution and financial strengths. —E. B.

Building the Core Business

Demand Seen for Tape Backup

Okay, you may not need to hook more than a gigabyte of storage to your PC. But some of Core International's customers do, and Core lets them throw together systems that go up to 3GB.

Core's particular forte is big, fast hard disks, but it offers a full range of disk drives, tape units, and backup software. "None of our competitors sells the complete solution," says President Rob-

ert Andrew. "You have to buy from four different suppliers and hope that the whole thing will work together."

Although it grew famous for high-end hardware, the company started out in the mid-1970s as a software/consulting firm. Founder Hal Prewitt entered the hard disk market in 1981, with an


(continues)

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Sales Representative

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2nd Quarter, 1988							
Units							Dollars
Part Number	Description	April	May	June	July	August	Total
2010-1	Frame	250	250	250	250	250	\$4,375
2010-2	Fork	100	100	100	100	100	\$1,000
2010-3	Seat	50	50	50	50	50	\$450
2010-4	Handlebar	100	100	100	100	100	\$4,500
2010-5	Stem	50	50	50	50	50	\$450
2010-6	Brake	100	100	100	100	100	\$4,500
2010-7	Wheel	100	100	100	100	100	\$4,500
2010-8	Spoke	100	100	100	100	100	\$4,500
2010-9	Hub	100	100	100	100	100	\$4,500
2010-10	Brake	100	100	100	100	100	\$4,500
2010-11	Wheel	100	100	100	100	100	\$4,500
2010-12	Spoke	100	100	100	100	100	\$4,500
2010-13	Hub	100	100	100	100	100	\$4,500
2010-14	Brake	100	100	100	100	100	\$4,500
2010-15	Wheel	100	100	100	100	100	\$4,500
2010-16	Spoke	100	100	100	100	100	\$4,500
2010-17	Hub	100	100	100	100	100	\$4,500
2010-18	Brake	100	100	100	100	100	\$4,500
2010-19	Wheel	100	100	100	100	100	\$4,500
2010-20	Spoke	100	100	100	100	100	\$4,500
2010-21	Hub	100	100	100	100	100	\$4,500
2010-22	Brake	100	100	100	100	100	\$4,500
2010-23	Wheel	100	100	100	100	100	\$4,500
2010-24	Spoke	100	100	100	100	100	\$4,500
2010-25	Hub	100	100	100	100	100	\$4,500
2010-26	Brake	100	100	100	100	100	\$4,500
2010-27	Wheel	100	100	100	100	100	\$4,500
2010-28	Spoke	100	100	100	100	100	\$4,500
2010-29	Hub	100	100	100	100	100	\$4,500
2010-30	Brake	100	100	100	100	100	\$4,500
2010-31	Wheel	100	100	100	100	100	\$4,500
2010-32	Spoke	100	100	100	100	100	\$4,500
2010-33	Hub	100	100	100	100	100	\$4,500
2010-34	Brake	100	100	100	100	100	\$4,500
2010-35	Wheel	100	100	100	100	100	\$4,500
2010-36	Spoke	100	100	100	100	100	\$4,500
2010-37	Hub	100	100	100	100	100	\$4,500
2010-38	Brake	100	100	100	100	100	\$4,500
2010-39	Wheel	100	100	100	100	100	\$4,500
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2010-42	Brake	100	100	100	100	100	\$4,500
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2010-44	Spoke	100	100	100	100	100	\$4,500
2010-45	Hub	100	100	100	100	100	\$4,500
2010-46	Brake	100	100	100	100	100	\$4,500
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2010-50	Brake	100	100	100	100	100	\$4,500
2010-51	Wheel	100	100	100	100	100	\$4,500
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2010-53	Hub	100	100	100	100	100	\$4,500
2010-54	Brake	100	100	100	100	100	\$4,500
2010-55	Wheel	100	100	100	100	100	\$4,500
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2010-62	Brake	100	100	100	100	100	\$4,500
2010-63	Wheel	100	100	100	100	100	\$4,500
2010-64	Spoke	100	100	100	100	100	\$4,500
2010-65	Hub	100	100	100	100	100	\$4,500
2010-66	Brake	100	100	100	100	100	\$4,500
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2010-68	Spoke	100	100	100	100	100	\$4,500
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2010-76	Spoke	100	100	100	100	100	\$4,500
2010-77	Hub	100	100	100	100	100	\$4,500
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2010-79	Wheel	100	100	100	100	100	\$4,500
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2010-86	Brake	100	100	100	100	100	\$4,500
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2010-92	Spoke	100	100	100	100	100	\$4,500
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2010-94	Brake	100	100	100	100	100	\$4,500
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2010-110	Brake	100	100	100	100	100	\$4,500
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2010-116	Spoke	100	100	100	100	100	\$4,500
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2010-139	Wheel	100	100	100	100	100	\$4,500
2010-140	Spoke	100	100	100	100	100	\$4,500
2010-141	Hub	100	100	100	100	100	\$4,500
2010-142	Brake	100	100	100	100	100	\$4,500
2010-143	Wheel	100	100	100	100	100	\$4,500
2010-144	Spoke	100	100	100	100	100	\$4,500
2010-145	Hub	100	100	100	100	100	\$4,500
2010-146	Brake	100	100	100	100	100	\$4,500
2010-147	Wheel	100	100	100	100	100	\$4,500
2010-148	Spoke	100	100	100	100	100	\$4,500
2010-149	Hub	100	100	100	100	100	\$4,500
2010-150	Brake	100	100	100	100	100	\$4,500
2010-151	Wheel	100	100	100	100	100	\$4,500
2010-152	Spoke	100	100	100	100	100	\$4,500
2010-153	Hub	100	100	100	100	100	\$4,500
2010-154	Brake	100	100	100	100	100	\$4,500
2010-155	Wheel	100	100	100	100	100	\$4,500
2010-156	Spoke	100	100	100	100	100	\$4,500
2010-157	Hub	100	100	100	100	100	\$4,500
2010-158	Brake	100	100	100	100	100	\$4,500
2010-159	Wheel	100	100	100	100	100	\$4,500
2010-160	Spoke	100	100	100	100	100	\$4,500
2010-161	Hub	100	100	100	100	100	\$4,500
2010-162	Brake	100	100	100	100	100	\$4,500
2010-163	Wheel	100	100	100	100	100	\$4,500
2010-164	Spoke	100	100	100	100	100	\$4,500
2010-165	Hub	100	100	100	100	100	\$4,500
2010-166	Brake	100	100	100	100	100	\$4,500
2010-167	Wheel	100	100	100	100	100	\$4,500
2010-168	Spoke	100	100	100	100	100	\$4,500
2010-169	Hub						

Hypertext Wins Respect

Owl Sends Guide on Diverse Paths

Apple's *HyperCard* has made a big splash, but these days you can even buy hypertext software from IBM—at least in Europe, where IBM sells a version of Owl International's *Guide*.

What is hypertext, and why are the crowned heads of computerdom scrambling for a bite? In the broadest sense, hypertext is the free-form, user-defined linking of information in a three-dimensional format. The term is thrown at products ranging from information managers such as Lotus's *Agenda* and Persoft's *Ize* to text management systems such as Seaside Software's *askSam*.

Guide, a more generic hypertext product that runs under *Windows*, at first appears to be a mild-

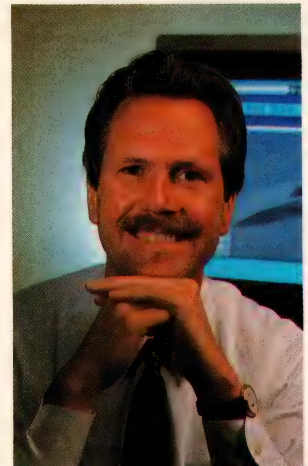
mannered word processor. But users can hide reference text behind words, phrases, and graphics or set up *button* linkages that call up information from other files. Subsequent users can click on the buttons, jumping from reference to reference until they reach the desired level of detail. A *hypermedia* capability even lets you call other applications or control peripherals such as videodisk players.

Guide first appeared in Macintosh form in 1986, then on the PC the following year. Owl, founded in 1985 as the marketing arm of a Scottish software developer, has become the "largest hypertext development group in the world," claims William Nisen, president of the

Bellevue, Washington, firm.

HyperCard, bundled free with the Macintosh, differs from *Guide* in adopting a card-file structure rather than a word processing framework, limiting the length of linked information to a card the size of a screen, and not allowing you to jump to a particular word. But *HyperCard* documents are easier to design. *HyperCard* will find use as a programming environment, whereas *Guide* will act more as a medium for hypertext publishing. Both products will be widely imitated.

Hypertext products are especially handy for culling information from large textual data bases. "The more data that is available, the more hypertext flourishes," says Nisen. Automated maintenance systems represent a key application, and computer-based training



RICH FISHMAN

Owl's William Nisen claims the company is "the largest hypertext development group in the world."

tied to interactive video also seems promising. But most business users will first encounter hypertext in an information management program or an application's help facility (as with Aldus's *PageMaker*).

"You're not going to see a lot of people creating hypertext data bases," (continues)

Tape Backup

(continued)

offering for an IBM machine that predated the PC, but the business really kicked off in 1984 when the AT's hard disk suffered from demonstrable glitches.

"Hal was one of the first to see the problem," Andrew remembers. Core quickly came out with a solid alternative, topped the entry with high-visibility ads suggesting the IBM drives should be dumped to create an artificial reef, and lapped up the business.

Today there's plenty of competition, but Core has grown to employ 135, not

counting manufacturing staff. "A very large percentage of our products still go into IBM computers, and a lot of those belong to true Blue customers," Andrew says. "I really don't know why IBM doesn't put in better drives."

In contrast, Core keeps pressing forward in magnetic disk technology. It was the first to introduce Enhanced Small Device Interface models in May 1986, four months before Compaq did and a year before IBM. Today the product line ranges up to 380MB models with 16ms access times.

Additionally, Core is preparing itself for a plunge into optical storage. "We made a decision to bypass WORM [write once, read many] technology" and wait for erasable equipment, Andrew notes.

Tape drives represent another bright opportunity. Currently, research shows that less than one-tenth of disk drives holding more than 40MB are backed up on tape, Andrew says. But he predicts that in two years manufacturers will bundle tape-backup systems with all but low-end drives. "It's in the disk manufacturer's best interest to do that."

The tape drive market has suffered heavily from incompatibility, but dominant tape supplier 3M is entering the drive market with a high-reliability 84MB Mini Data Cartridge design. (Core is writing the accompanying software.) "3M never wanted to come out with a tape cartridge unit, but it decided to make a major play in the market, partly to protect its investment," Andrew remarks. He hopes that the Mini Data Cartridge will finally nail down a standard. "If 3M can't do it, nobody can."

—E. B.

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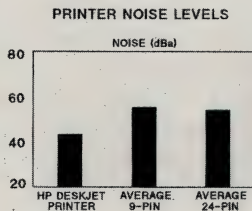


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UNIX

(continued)

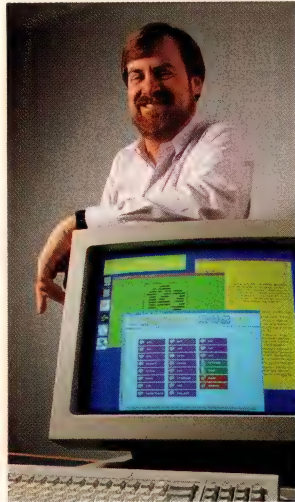
just yet. UNIX is ahead right now."

These fighting words come from the president of Sun Microsystems, a company whose workstation sales have exploded to a billion dollars a year, turning the six-year-old firm into Silicon Valley's fastest-rising star. With AT&T faltering and other vendors offering the operating system merely as an option, Sun is becoming the UNIX standard bearer in the hypercompetitive PC environment where DOS is king and OS/2 is heir apparent.

Sun's chosen weapon is the 386i, the first machine that uses Intel's 25-MHz 80386. Accompanied by appropriate high-end hardware, it starts at \$8000 and climbs rapidly.

More crucial is Sun's system and network software. Like OS/2, Sun's UNIX-based operating system supports large memory and true multitasking. Unlike OS/2, it supports 32-bit processing on the 80386, which dramatically speeds number-crunching tasks like those involved in computer-aided design. Also unlike OS/2, the 386i can run multiple DOS applications. Sun manages all this through an icon-based desktop manager with context-sensitive hypertext help; this will evolve into the even more elegant Open Look interface that Sun and AT&T are currently designing.

The 386i also bundles in hardware and software connections to Sun's sophisticated networks,



Sun's Barry James Folsum expects an "acceleration of enthusiasm" for UNIX among software vendors.

with automated installation facilities that Sun claims will allow normal humans to unpack a machine and get it running on the net in less than 30 minutes.

The target is not just Sun's traditional technical user but all those in the rapidly converging worlds of high-end PCs and low-end workstations. One prime example would be a financial firm trying to automate a trader's desk, suggests Barry James Folsum, vice president and general manager of Sun's East Coast division in Billerica, Massachusetts. "People try to do that with PCs, but they just don't have the system software," he claims. Sun also sees opportunities in electronic publishing, project management, work-group office automation, legal applications, and many other niches.

Exploiting these opportunities, however, requires a rich selection of application packages, and this has been UNIX's greatest weakness. Dur-

ing the past year Sun's McNealy forged an alliance with AT&T computer head Vittorio Cassoni to build an open standard merging the conflicting dialects that have plagued UNIX for years. But other vendors took offense, complaining that they would get new releases months after AT&T and Sun products hit the market. UNIX took two body blows in May when Cassoni abruptly returned to Olivetti, and seven major vendors (including IBM and Digital Equipment Corporation) announced plans to jointly breed their own strain of UNIX.

While industry observers enjoy this bizarre spectacle, and many doubt that the joint effort will accomplish anything, most see the UNIX bandwagon

being pulled in two directions. Folsum acknowledges the potential for confusion, but insists that variations between the two versions will be small.

Lotus and Ashton-Tate have committed to UNIX development (although not with overwhelming zeal), and Folsum predicts "an acceleration of enthusiasm" among PC software suppliers. Sun intends to intensify that mood by creating a slim, trim UNIX version for machines with 4MB of memory.

"Sun's used to selling tens of thousands of workstations," Folsum says. "We're getting ready to sell hundreds of thousands—or millions." —E. B.

Hypertext

(continued)

says Maureen Fleming, editor of the *Software Industry Bulletin* in Stamford, Connecticut. "But people will use CD ROM-based hypertext documents created by the information industry and catalog publishers."

Finding that hypertext in its purest form may be too chaotic for large-scale applications, Owl has launched a network-based document management package called *Ilex* that combines *Guide's* hypertext engine with traditional data base techniques.

Hypertext's major stumbling block is the time and planning re-

quired to set up the linkages. Owl is looking to artificial intelligence to streamline this process. "One person's linkages are another person's sausages," quips Nisen. "AI could help to develop webs of knowledge, so that you could generate linkages predicated on the needs of the user."

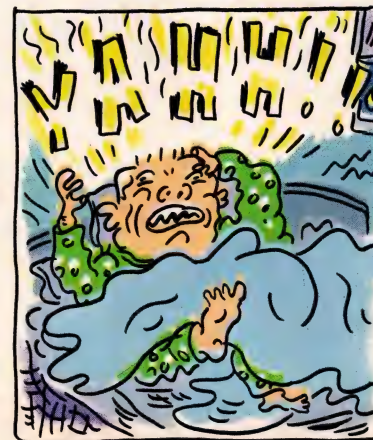
As software designers sort out the problems and promises of hypertext, the market remains small. But the moves by IBM and Apple, and hints of upcoming Microsoft products, suggest that hypertext's time is at hand. —Eric Brown

Daniel Brogan writes a column on personal computing for the Chicago Tribune; Eric Brown is a PC World contributing editor. ●



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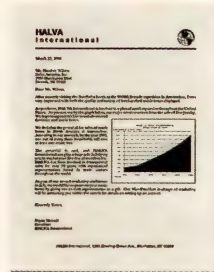
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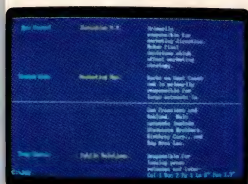
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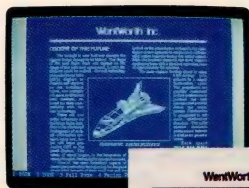
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WordPerfect 5.0's improved Preview feature lets you see what your document will look like before you print.

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Circle 175 on reader service card

IBM Puts More Power on the Desktop

Big Blue upgrades the Model 50 and hauls its 80386 machines up off the floor.

*Eric
Bender*

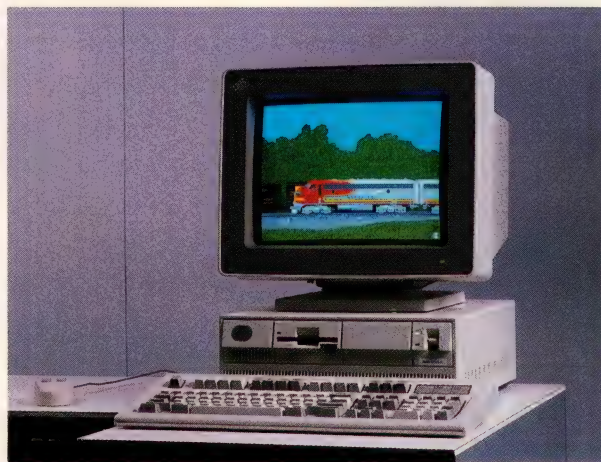
IBM executives freely admit that almost from the beginning, PS/2 customers asked for a zippier Model 50 and for ways to transfer 80386 performance from floor-standing towers onto a desk. That's exactly what the giant manufacturer began delivering in June with its more powerful desktop Micro Channel Architecture models, epitomized by a new 25-MHz 80386 machine.

The much-belittled—and much-bought—Model 50 has reemerged with zero-wait-state operation and up to 60MB of hard disk storage, boosting performance by as much as 35 percent. The Model 50 appears to have estab-

lished the visual standard for PS/2s: All the new 386-based Model 70s closely resemble the Model 50 and fit into the same 16½-by-14½-by-5½-inch box, but they have fast hard disks as large as 120MB. The products are also competitively priced—at least in comparison to offerings from Compaq Computer.

Big Blue: Speed King?

IBM's newest heavy-weight contender is the Model 70-A21, a 25-MHz powerhouse scheduled to ship in September. Priced at a thought-provoking \$11,295, this zero-wait-state machine is said to be capable of running half again as fast as the top Model 80. "It will be the fastest PC on the desktop, bar none," declares William Lyons, general manager for personal systems merchandising, National Distribution Division. The A21 includes an Intel 82385 cache memory controller with 64K of 30ns RAM, 2MB of 80ns RAM



If you've seen one of this summer's crop of PS/2s, you've seen them all—from the outside, anyway. This is the Model 70-A21, a 25-MHz 80386-based machine.

expandable to 8MB available on the system board, and another 8MB on a 32-bit memory board. It also has a 1.44MB floppy drive; VGA graphics; one Micro Channel 16-bit and two 32-bit expansion slots; and a 23ms, 120MB, 3½-inch internal hard disk with an integrated Enhanced System Device Interface con-

troller. A 25-MHz 80387 coprocessor is optional.

How is all that gear crammed into the box? The A21—and for that matter, all the other new models—exploits surface-mount technology on both sides of the system board and stands some components vertically. ("Desktop real estate is very scarce, so we're going up, like Manhattan," explains one IBM developer.) The A21 also places processor,

PC World Previews are informal assessments of products that at press time were still in the development stage. Complete reviews—including features evaluations and performance testing—will appear only after a product is officially released.

coprocessor, and memory-caching chips on a functional island anchored just above the main board.

Leveraging other in-house technology, all the new systems incorporate homegrown 1-megabit DRAM and can be expanded to 16MB with 1MB or 2MB modules. The 120MB drives, based on high-density "thin film" designs, represent a sixfold increase in the capacity of IBM's 3½-inch hard disks.

The two other Model 70 configurations, Models 70-121 and 70-E61, are both available now and run at slower clock speeds than the A21. They operate at zero to two wait states without memory caching. The 20-MHz Model 70-121 ships with 2MB of memory and a 120MB hard disk for \$7995. The 16-MHz Model 70-E61, yours for \$5995, incorporates 1MB of RAM and a 60MB hard disk. At press time, a similarly equipped Compaq Deskpro 386/20, which does have memory caching and a 130MB drive, weighed in at \$9499, while a 16-MHz Deskpro 386 with a 40MB drive cost \$6499.

Z Upgrade

"The new 50 is faster than any popular AT compatible now sold," claims William Lowe, head of IBM Entry Systems Division. Two Model 50 Zs debuted (the Z stands for *zero wait state*). These machines replace the orig-

inal model's 150ns memory with speedy 85ns chips and come with larger, faster disks. A Model 50-061 with its 27ms 60MB drive will cost \$4595, while the 50-031, which includes a 39ms 30MB drive, will go for \$3995. By comparison, a 12-MHz Compaq Deskpro 286 with a 40MB drive is priced at \$4199.

Beginning in September, IBM will allow current Model 50-021 owners to replace their 20MB drives by snapping in the new 60MB device for \$1695. (The 50-021, like the newer desktops, ac-

cepts only one internal hard disk, leaving owners with no obvious role for their old drives.)

IBM isn't selling a faster-memory upgrade; the system board was completely recast for the Z. IBM shrank the board 30 percent, melding 65 logic components into five gate arrays, among other moves. IBM expects the higher levels of integration, combined with the new disks, to boost reliability by 30 percent. The firm's engineering goals continue to emphasize reliability, often over performance.

IBM has not eliminated any existing machines and it hasn't cut pricing as broadly as expected, given the PS/2s' pandemic heavy discounting. Prices have been lowered on several floor-standing offerings. The high-end Model 80-311 has moved from \$13,995 to \$11,995, the 80-111 from \$10,995 to \$8995, and the 80-71 from \$8495 to \$7995. The Model 60-71 was trimmed from \$6295 to \$5795.

Overall, the product debut leaves IBM's line with a wide range of price/performance points. The evolution may also create a little numerical confusion, because now some Model 50s are faster than the Model 60s and some Model 70s are quicker than some Model 80s.

IBM is far from abandoning its towers; plans for enhanced versions of the floor-standing units are under way. But in time, suggests Lowe, those machines will get less personal. "Their primary role in life will be as network servers." ●

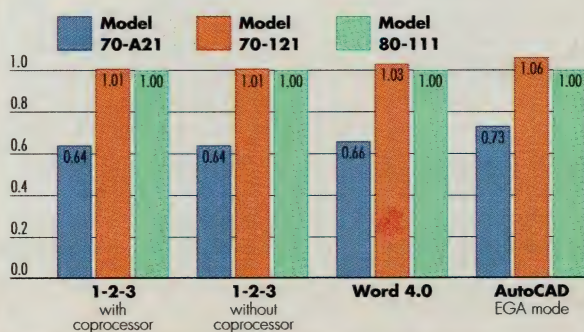
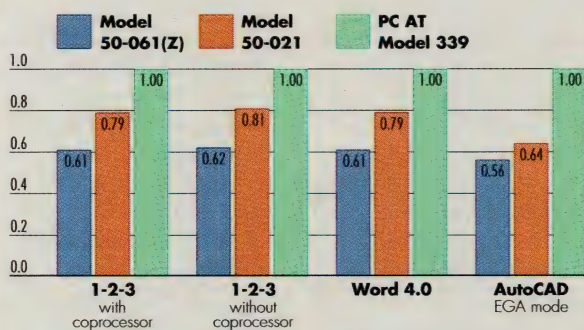
Eric Bender is PC World's East Coast editor.

Model 70, Model 50 Z
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PS/2 Applications Benchmarks

Running DOS applications, IBM's new top-end 80286- and 80386-based desktops (top and bottom) show significant performance boosts over earlier models, according to preliminary tests for PC Digest by NSTL. For 80286 benchmarks, the time of the 8-MHz IBM PC AT Model 339 is established as an index of 1.00; for 80386 tests, all times are indexed to the 20-MHz IBM PS/2 Model 80-111. The smaller the number, the faster the performance.



Compaq 386s: Small Wonder

Compaq introduces the 80386 PC "for the rest of us"

—a small but mighty powerhouse based on Intel's new 80386SX processor.

**Mike
Hogan**

Most market watchers were skeptical two years ago when Compaq Computer broke ranks and introduced an 80386 computer before IBM had bestowed its blessing on the technology. At the time, Compaq president Rod Canion acknowledged that most users were content to cruise along on their 10-MHz ATs. But he reasoned that his 16-MHz Deskpro 386 would find a home among computer-aided-design engineers, desktop publishing aficionados, and power spreadsheet and data base jockeys.

But not even Canion understood just how many power users (or would-be power users) are out there. His company has been selling 80386 systems as fast as it can roll them off the line. Meanwhile IBM, Advanced Logic Research, AST Research, and oth-

ers are gleefully filling every order that Compaq can't while pumping up demand for their own models.

The 80386 market looks like a hot day at the speedway with contenders wrangling over horsepower—16 MHz, 20 MHz, and now, several entries based on Intel's turbo-charged 25-MHz 80386.

But the market is about to broaden dramatically. Intel has just announced another chip that promises to bring 80386-based processing power to those of us who have thus far been kept out of the fast lane by the price or size of today's 80386-based systems.

And true to its track record, Compaq has grabbed the lead again with its new model, the Deskpro 386s, a downsized computer at a popular price—"the 80386 for the rest of us," as Vice President of Sales and Marketing Michael Swavely describes it. The Deskpro 386s is a fully functional 80386 priced at

less than half what you'd shell out for Compaq's other new offering, the Deskpro 386/25.

Step Up to a Smaller Platform

How do they do it? The design starts with the processor. The 80386SX is a repackaged version of the standard 80386. Like the original 80386, the 80386SX performs 32-bit processing internally. However, it looks like an 80286 to the rest of the system, with 24 address lines and 16 data lines, instead of 32 each. The pin reduction helps make the 80386SX, sometimes called the P9, about 30 percent cheaper than its predecessor, and corresponding system circuitry is also less expensive. Compaq also saves money by producing the Deskpro 386s on assembly lines already tooled up for its other 80386 machines. But the price is mainly a reflection of the compa-

ny's desire to bring you up from 80286 machines (for a few dollars more, of course).

A small-footprint machine (less than 15 by 16 inches), the Deskpro 386s is particularly attractive to the general business user, with prices beginning at \$4000 depending on configuration. By comparison, the 12-MHz Deskpro 286 and the 10-MHz IBM PS/2 Model 50 are priced between \$3000 and \$3600, and the state-of-the-art Deskpro 386/25 starts at \$10,000.

But don't let the Deskpro 386s's diminutive price and footprint fool you. You get all the benefits of a straight 80386, including the ability to create multiple virtual machines for multitasking. The 80386SX runs all the software an original 80386 does, although 32-bit software moves data in and out of the chip only half as fast as on a regular 16-MHz 80386 because of the 16-bit external data path.

Frankly, that shortcoming won't be much of an annoyance. Even now, two years after the first 80386 CPU hit dealer shelves, only a handful of applications take full advantage of 80386 capabilities such as 32-bit instructions; and an 80386 version of OS/2 remains a distant dream. In the meantime, the Deskpro 386s will run your 16-bit software 90 percent as fast as the standard 16-MHz 386 (again, it takes a hit because of the data bus), and control programs like Quarterdeck's *Desqview* or Microsoft *Windows/386* will let you run multiple applications simultaneously in virtual mode without OS/2.

Overall, throughput is 40 percent faster than that of a Deskpro 286, Compaq says. So you get the CPU platform of tomorrow at an affordable price today, with the 80386 speed that appeals to the power user in all of us.

Integration and More Integration

Like other Compaq 80386 machines, the Deskpro 386s has a concurrent bus design, with memory running at processor speed, while input/output takes place at 8 MHz to ensure compatibility with the installed base of add-on boards. The Deskpro 386s comes with 1MB of memory on the motherboard, and as much as another 12MB can be added to a



ERIC MOORE

Compaq's Deskpro 386s takes advantage of Intel's new 16-MHz processor to deliver inexpensive 80386-based computing in a small package.

dedicated 16-MHz, 16-bit memory expansion slot.

That leaves four 8/16-bit slots free for expansion boards, and you won't have to waste them on disk or video controllers. The Deskpro 386s integrates many standard functions on the motherboard, including a hard/floppy disk controller and a 640-by-480 VGA-compatible Video Graphics Controller (VGC) with 16-bit video RAM that Compaq claims displays graphics and scrolls text up to 50 percent faster than competing products. Parallel, serial, and pointing device ports are built in as well.

Compaq still refuses to ratify the 3½-inch floppy drive standard, instead offering it as an option to a 5¼-inch, 1.2MB drive. The Deskpro 386s accepts up to four storage devices, which can include two 20MB, 40MB, or 110MB hard drives and a 40MB

or 135MB tape drive.

Both the 20MB and 40MB drives have 29ms access times, while the 110MB drive has a 1:1 interleave and a 25ms access time. Disk caching is included, adding a 35 to 69 percent performance advantage, depending on the hard disk.

The 386s comes in three models: the Model 20 and Model 40—whose names bespeak their principal difference, the size of their hard drives—and a floppy-only Model 1 for networks or multiuser systems. You choose your display from among Compaq's VGA-compatible color and monochrome monitors. The Model 1 will sell for \$3799, the Model 20 for \$4499, and the Model 40 for \$5199; all are available immediately.

Naturally, Compaq isn't abandoning the per-

formance race—as evidenced by the Deskpro 386/25 unveiled alongside the Deskpro 386s. The 386/25 boasts several new feature enhancements besides the faster processor. The 6-MIPS machine comes with a 110MB or 300MB hard disk drive and incorporates more surface-mount and Compaq custom-gate-array technology on the system board. The 386/25 offers both a 25-MHz Intel 80387 coprocessor and a single-chip version of the Weitek coprocessor that runs two to three times faster than the 80387. For those who really, really need storage, Compaq now offers an external subsystem that will provide any of its 80386 systems with up to 600MB. The Deskpro 386/25 Model 110 will sell for \$10,299 and the Model 300 for \$13,299; both are available immediately.

The 386/25 is an impressive machine. But "for the rest of us," the Deskpro 386s still promises to overshadow its larger cousin. Sometimes, less is more. ●

Mike Hogan is PC World's News Editor.

Compaq Deskpro 386/25, Compaq Deskpro 386s

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For more information, see Products Featured in This Issue.

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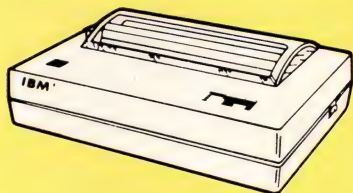
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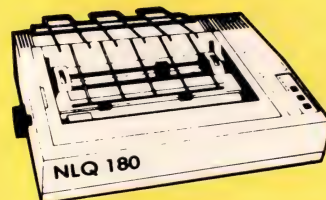
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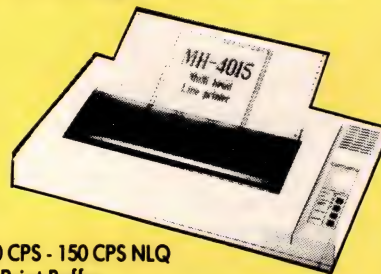
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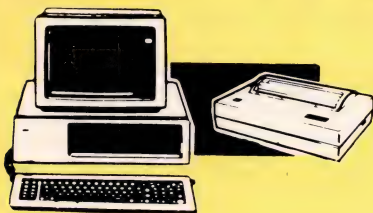
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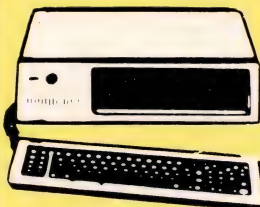
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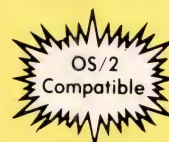


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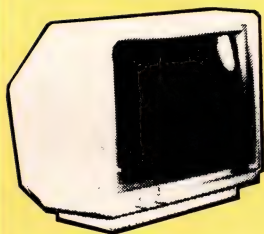
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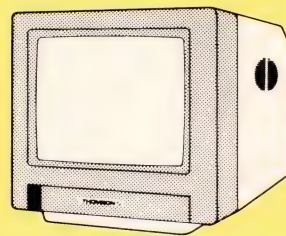
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PRODUCT OUTLOOK

86 PRODUCT OUTLOOK

Netpro 386/25

With system memory expandable to 32MB and 5.5-MIPS processing, Simple-Net's 80386-based computer is the equal of many a mini.

Diamond Scan Monitors

Mitsubishi's three versatile color monitors adjust to multiple scanning frequencies for VGA and beyond, yet have the accuracy of fixed-frequency displays.

Mini Modem

On the road? QIC Research's pocket-size modem has the big-time talents to keep corporate data and electronic mail within reach.

Linus Write-top

Look, Ma, no keyboard! Use a stylus to write directly on the detachable screen of this ingenious laptop, which stores handwriting as ASCII characters.

IntelliPort PS8

Create a low-cost multiuser system with your PS/2 and Computone's add-in board and share data and files among eight terminals or PCs.

Telepower +

The prize module in Lantor's versatile ten-part program merges a data base with a mass-mailing list to fax letters for direct marketing campaigns.

90 BRIEFLY NOTED

IntelliForm

Mind Path's AI-based program lets you create forms—complete with prompts and help messages—to guide users in making correct entries.

WordStar Professional 5.0

What does 5.0 have that 4.0 doesn't? Three hundred new features, from an SAA-compatible interface to automatic file saves and ASCII conversions.

Project Calc, Decision Analyst

Two new tools for 1-2-3-based project management. Play "what if" with deadlines and costs, and automate cumbersome decision techniques.

PC Password

With its encryption algorithm in an EPROM chip, Computer Commodities' add-on board plus software provides the ultimate in password security.

Lotus 1-2-3 Video Training

SoftVision's 1-2-3 training program plays on your VCR, teaching basic spreadsheet skills.

94 UPDATE

Professional Write 2.0, Professional File 2.0

Expanded file compatibility, improved formula and calculation abilities, and new import/export powers highlight these two upgrades.

Framework III

You'll find a built-in E-mail system, an enhanced outliner, and new import/export functions in the latest release of Ashton-Tate's integrated package.

Epson Equity II +

Epson's space-saving AT compatible adds a faster microprocessor with switchable clock speeds.

EasyCAD2

Rewritten in assembly language for enhanced performance, Evolution's low-cost CAD package has doubled its inventory of features.

Page Reader 2.0

Evelyn Woods, listen up: Saba Technologies' improved hand-held OCR scanner can now take in the equivalent of 400 words per minute.

MindReader

What's new with this AI-based shareware word processor? A helpful interface, larger file capacity, user-definable colors, and full DOS path support.

Netpro 386/25

PC Social Climber

You can't be too rich or too thin, and your computer can't be too fast or have too much memory. Simple-Net Systems, heretofore best known for its low-cost local area networks, aspires to the ideal with its Netpro 386/25.

The heart of the Netpro 386/25 is an 80386 processor beating at a strong 25 MHz with zero wait states—the fastest processing available on a PC. In fact, the Netpro, capable of processing more than 5.5 MIPS, is as fast as most minicomputers.

The rest of the computer is equally impressive. System memory starts at 4MB—about four times the normal amount—and expands to 8MB on the system board and to 32MB using fast 100ns memory add-ons in the system's two proprietary slots. Capacity is further enhanced with a 64K static memory cache accompanying the Intel 82385 cache controller.

Simple-Net considers its progeny best suited for action as a design workstation or file server on a LAN. Equipped with your choice of either an MGA, VGA, or 8514 (1024 by 768 pixels) display board, the 386/25 provides built-in appeal for CAD/CAM users. Its EtherLAN Plus

Ethernet adapter and software also make it network ready. After installing Netpro's graphics card, disk controller, and Ethernet adapter, you have available two 32-bit memory slots and two 8/16-bit and one 8-bit expansion slots.

Naturally, the Netpro 386/25 has enough processing power, memory, and storage capacity to run OS/2 as well as DOS. It also gives you a choice of 80MB or 140MB storage capacity, with an average access time of under 25ms.

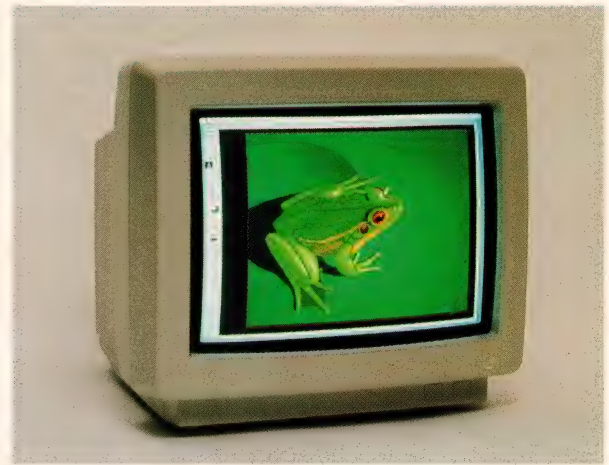
You choose between a \$12,499 system with an 80MB hard disk and a 5¼-inch floppy, and a \$13,499 system with a 140MB hard disk and both a 5¼- and a 3½-inch floppy. You can opt for OS/2 for \$325 or DOS 3.00 for \$125. Simple-Net Systems, 545 W. Lambert Rd., Ste. A, Brea, CA 92621; 714/526-5151.

Diamond Scan Monitors

Multiscanning the VGA Horizon

Graphics equipment already comes in more acronyms than you'd find in a bowl of alphabet soup, and vendors show no sign of slowing down. So how can you ensure that the color monitor you buy today will be able to handle the graphics standard of tomorrow (or the day after)?

If VGA has already become the minimum graph-



Keep your high-res graphics options open with Mitsubishi Diamond Scan monitors such as the HL6905, which adjusts to a variety of color/graphics adapters at VGA quality and beyond.

ics resolution you can tolerate, or if desktop publishing or computer-aided design software is in your future, you may be ready for Mitsubishi Electronics' Diamond Scan multiple-frequency monitors.

The FL6605, HL6605, and HL6905 Diamond Scan monitors give you a broad slice of the higher-resolution-display pie, adjusting to the scanning frequency of various color/graphics boards. You start at VGA (640 by 480), go to 800 by 560, and end up at 1280 by 1024. This means you can use high-frequency, high-resolution controllers with applications that have the appropriate display drivers. For example, you can use a 48-kHz or 64-kHz Imagraph card with AutoCAD.

If you've worked at high resolutions before,

you probably purchased a fixed-frequency monitor matching your controller and had a technician adjust it to provide the least distorted, most accurate picture. But with Mitsubishi's monitors you get the accuracy of a fixed-frequency display without the technician, since Diamond Scan monitors let you work even with the new multiple-frequency controllers.

Front-panel controls let you adjust the horizontal and vertical position of the displays for as many as 20 frequencies. A scan-mode memory stores your settings.

All the units offer the same features except for dot pitch and screen size. The HL6605, with a .31mm dot pitch, is \$1945, and the FL6605, with .26mm dot pitch, is \$2145. Both give you a 15-inch display area on a 16-inch screen—appreciably larger than the typical 13-inch

display on a 14-inch screen but still small enough to fit atop PCs with small footprints. The HL6905 has the same dot pitch as the HL6605 but has a 19-inch display on a 20-inch screen; it retails for \$3650. Mitsubishi Electronics America, Computer Peripherals Division, 991 Knox St., Torrance, CA 90502; 213/515-3993.

Mini Modem

Data to Go

All too often, life on the road is a series of small annoyances that loom larger the farther you get from home. You can't do much about restaurant food and uncomfortable hotel beds, and you may run out of clean socks. But you'll never be cut off from your data as long as you pack a laptop and QIC Research's Mini Modem.

Once you've downloaded the worksheet you forgot on your hard disk or uploaded the report that must be at the office tomorrow morning, you won't ever want to leave home without QIC's pocket-size communications companion. It delivers your electronic mail and lets you tap into the corporate data base whenever you need to.

The 4-by-2½-by-1-inch device plugs directly into your computer's serial port, runs on either an internal 9-volt battery or an AC adapter, and works with either tone or pulse telephone lines. It plugs into your phone with a standard RJ-11 jack.

Despite its size, Mini Modem offers many features provided by full-size modems, including a built-in speaker with volume control software, status LEDs (indicating low battery, 300- or 1200-bps operation, and carrier detect), and auto-dial/redit and auto-answer capabilities.

If you travel overseas, you can quickly configure Mini Modem to operate under the European 300- or 1200-bps protocol via a DIP switch. For North America, you get Hayes-command-set compatibility, enabling you to run communications software such as *Crosstalk XVI* and *ProComm*.

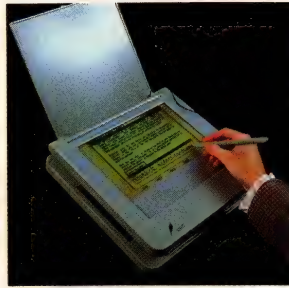
Other switches let you quickly enable or disable the auto-answer capability and set other interface parameters for various hardware and protocols. But you don't have to be a communications techie to use Mini Modem—it comes from the factory preconfigured for operation on a standard PC or compatible.

Best of all, Mini Modem carries a mini price tag of \$139, which includes the modem, a 7-foot phone cable, a battery, an AC adapter, and *Bitcom* communications software. QIC Research, 1961 Concourse Dr., Ste. C, North San Jose, CA 95131; 800/843-0806.

Linus Write-top

The Write Stuff

You can work on your computer as long as you can find a place to park your keyboard. But what if you're standing up or



The Linus Write-top's 3-pound electronic notepad lets you move around while you jot notes directly on its 80-column-by-25-line display. Its handwriting recognition algorithm translates your notes to ASCII text.

moving around? And what if you don't like typing on a keyboard, period? If you're a manager on the move, a doctor on rounds, or just someone who hates to type, the Write-top from Linus Technologies will give you the equivalent of an electronic clipboard.

The Linus Write-top is essentially a laptop without a keyboard based on a 7.16-MHz 8088 processor and fitted out with an 80-column-by-25-line display sensitive to a stylus. You write directly on the screen, and a handwriting recognition algorithm stores your notes in ASCII format.

Configured with a 3½-inch internal floppy drive and an optional modem, the Write-top weighs just 9 pounds. But you need to hold only the detachable 3-pound display that connects to the rest of the unit with a 3-foot cord.

Linus has taken pains to make the stylus on the display feel like a pen on paper; the display's elec-

trosensitive glass is lightly etched so that the stylus won't slip around when you write. The portable is equipped with the *Your-Write* program, with which you teach the system to recognize your handwriting. It should take you only 30 minutes of writing the alphabet several times to teach the system the way that you write letters, according to Linus Technologies. The recognition software takes 40K of the laptop's 640K memory.

You create your notes or memos with the *Just-Write* text editor; entering and editing text with the stylus; drawing a line through a word deletes it. Since the Write-top comes with a connection for a standard XT-compatible keyboard, you can also key text into *Just-Write* and then edit it with the stylus. And you can buy *Just-Write* with a file transfer program that runs on a standard PC and converts word processing files into *Just-Write*'s format.

The Write-top runs for up to 7 hours off a camcorder battery that lasts as long as five years. The battery recharges whenever the AC adapter is used.

The basic Write-top system—which includes *Your-Write* and *Just-Write* software, DOS 3.30, a battery, an AC adapter, serial and parallel ports, and the backlit LCD display—costs \$3145. Write-top also comes with a slot for a credit-card-size memory card containing 512K of CMOS RAM for \$500. You can add a 300/1200-bps internal modem for \$245. Any PC-compatible, separately

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TI's OmniLaserTM 2115. The network printer you need when your application needs are demanding.

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With the OmniLaser 2115, you have the flexibility you need for today's sophisticated printing applications. You also have the confidence of knowing that your OmniLaser offers a safe path to the applications of the future.

The OmniLaser family also includes the 2106 workstation printer and the 2108 small-cluster printer. So whatever the demand of your application, there's a multipurpose OmniLaser that's right for you.

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powered external disk drive can be attached through the parallel port. A file transfer program for *Just-Write* is \$125, and a shoulder bag is \$99. Linus Technologies, 1889 Preston White Dr., Reston, VA 22091; 703/476-1500.

IntelliPort PS8

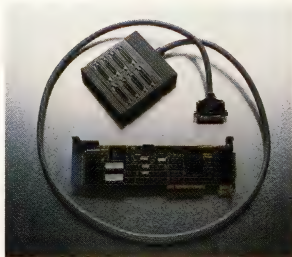
PS/2 Plus PS8 Equals More

Problem: You need to share data and files among a handful of desktops, but you don't want to buy an expensive multiuser system or tangle with the cards, server, and special software of a local area network.

Solution: Take your PS/2 Model 50, 60, or 80 and create a low-cost multiuser system with a Computone add-in board.

Computone's IntelliPort PS8 adds its own coprocessing technology to the PS/2's 80286 or 80386 processing speed and wide Micro Channel data pathway so that up to eight terminals or PCs can share the PS/2 processor. Adding a terminal costs as little as \$150 per node, and virtually no performance degradation takes place when new terminals are connected.

A ribbon cable connects the board to an expansion box that houses eight serial port connections (if you have the slots, you can add three more PS8 boards and boxes and support as many as 32 terminals). The PS8 incorporates its



Take advantage of the IBM PS/2's excess processing capacity to create a low-cost multiuser system with Computone's IntelliPort PS8.

own 10-MHz 80186 processor, which buffers terminal input/output and minimizes the load on the PS/2 processor. The PS8 processor board also exploits a dual-port communications chip to transfer data at 38.4 kilobits per second, rather than the 9600-bps maximum of the typical serial port. Data also travels faster along the Micro Channel than it does on the typical AT bus.

The PS8 board comes with the drivers you need to use off-the-shelf multiuser operating systems like UNIX and PC-MOS for distributing processing time among the nodes. You also get three ROM-based utilities: *IntelliView*, which allows you to run dual applications when you use terminals (each application appears in its own window); *IntelliPrint*, which lets any node on the system use any printer on the system; and *IntelliKey*, which allocates function keys on terminals or PCs.

Each of the PS8's eight terminal connections can be configured individually for different bps rates, buffer sizes, and handshake signals. The PS8 multiuser board—including the board drivers, the

expansion box, the ROM-based software, and a manual—sells for \$1295. Computone Systems, Multi-User Products Division, 5555 Oakbrook Pkwy. #280, Norcross, GA 30093; 404/475-2725.

Telepower +

Max the Fax

Direct marketing for 10 cents a letter may sound too good to be true, but Lantor can make it happen with *Telepower +*, a ten-module program that trims time as well as phone and mail charges from direct marketing campaigns. *Telepower +* merges a data base with a mass mailing list to help you fax as many as forty 200-word letters an hour to any list you identify. What's more, you can program the Mass-Fax module in *Telepower +* to send your messages after hours when telephone rates are low. Charges are as low as 10 cents a letter when you use a WATS line or similar business phone service.

To write those letters, you can use *Telepower +*'s word processing module or import copy from programs like *WordStar* and *Microsoft Word*. You do need *Telepower +*'s data base manager, *Profile*, but that isn't as limiting as it sounds.

Profile, which is included, also lets you set up an unlimited number of calling groups using an unlimited number of fax phone numbers. If a cus-

tomers wants to know where your closest retail outlet is, simply type in the customer's ZIP code and *Profile* will locate the six nearest dealers.

That aside, the real coup is the Mass-Fax module, which eliminates all envelope stuffing and postage metering. You also can use it to send tel-ex/TWX, EZ-Link, and E-mail messages.

Telepower + works with most major brands of PC fax boards, including ADT's SmartFax, Panasonic's FaxPartner, and Datacopy's MicroFax. It requires 460K of memory on an IBM AT or compatible equipped with 640K, a 20MB hard drive, and DOS 3.00 or a later version. A single copy retails for \$495; the LAN version goes for \$1495. Lantor, Inc., 13650 Gramercy Pl., Gardena, CA 90249; 213/324-7070.

BRIEFLY
NOTED

IntelliForm

Mind Path Technologies has introduced a form generator that relies on artificial intelligence techniques to make form creation and form usage quicker and easier.

Like many products in the form-generation genre, *IntelliForm* lets you lay out a form on your screen so that what you see is what you get, and it also lets you specify

You can rely on your file server for LAN communications...



All you need is patience. And faith.

You're getting the drift of this message already. File servers aren't designed to solve the PC user's communications problem. But now there's a system that is.

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It's a general purpose local area network for PCs and minicomputer hosts. It connects you with the host, other PCs, and peripherals such as printers, plotters, or modems through simple, pop-up menu commands.

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Circle 199 on reader service card

prompts and help messages for the fields (blanks) on the form.

You can give data entry personnel even more guidance by defining rules for filling out each blank. For example, you can set up rules allowing only certain data to be entered in a blank, and guide your employee to correct entries via menus and other aids. You can define a mathematical formula and prompt your employee for the values the formula needs, with the result of the calculation automatically appearing in the blank. And you can set up rules that pass the data entered in one blank to dependent blanks.

IntelliForm prints finished forms on any character printer. If you want fancy forms with logos and other graphics, you can buy *IntelliForm* with FormMaker Software's *FormMaker II* design package for printing on a LaserJet-compatible or PostScript laser printer.

IntelliForm includes a screen editor, for designing forms and specifying rules, and a screen processor that employees use to execute forms. The program requires DOS 2.10 or a later version and 512K; it retails for \$495 for a single machine license and \$95 for each additional copy of the screen processor. *IntelliForm* bundled with *FormMaker II* is \$990. Mind Path Technologies, 12700 Park Central Dr. #1801, Dallas, TX 75251; 214/233-9296.

WordStar Professional 5.0

With the goal of providing full word processing capability even on floppy-based PCs, MicroPro International has bolstered its long-time best-seller, *WordStar*, with more than 300 features.

Changes to *WordStar Professional 5.0* start with a new interface, which MicroPro has made compatible with IBM's System Application Architecture so that it will continue to evolve within industry standards, protecting your investment in learning. Version 5.0 has pulldown menus plus page-preview capabilities that let you see on screen how all the typefaces and sizes in a document as long as 144 pages will appear in print. You can also split the screen into two resizable horizontal windows to edit two documents at once.

WordStar Professional 5.0 contains the same ease-of-use features available in version 4.0, includ-

ing advanced footnoting capabilities, automatic reformatting, macros, and an undo command. Moreover, you can make outlines or create up to eight newspaper-style snaking columns. For safety, you can set the program to save your files automatically at regular intervals of less than a minute.

Also new is a data entry screen for creating a data base of mailing labels on which you can perform sorts and retrievals. A new telecommunications module, accessed in the opening menu, lets you go on line to upload or download files. Version 5.0 automatically converts *WordStar* files to ASCII for transmission to mail services like MCI Mail. It also converts incoming ASCII files to the *WordStar* format.

Finally, the word processor supports a wider variety of printers, including PostScript-compatible laser printers, and offers proportional spacing for simple desktop publishing applications. A 100,000-word spelling checker and a thesaurus

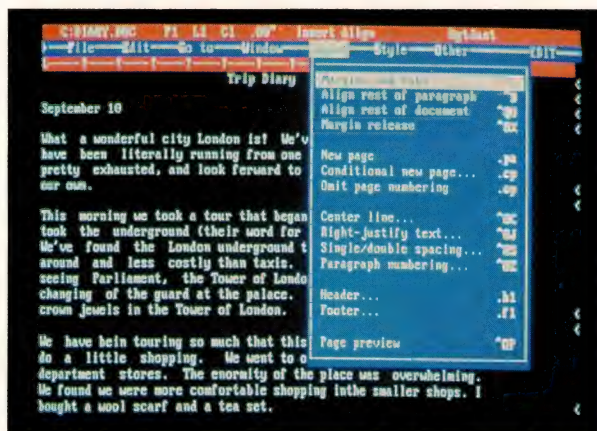
containing more than 200,000 synonyms are included.

WordStar Professional 5.0 requires 320K of memory without the page preview function, 512K with it, and DOS 2.00 or a later version. It retails for \$495. Upgrades are available to registered owners for \$119. MicroPro Int'l, 33 San Pablo Ave., San Rafael, CA 94903; 415/499-1200.

Project Calc, Decision Analyst

Frontline Systems has unveiled two tools to help your 1-2-3-based project planning or decision analysis. *Project Calc* lets you use 1-2-3 to plan project schedules and budgets. You express task durations, interrelationships, and cost assignments in the rows and columns of a worksheet, guided by 1-2-3-style menus and prompts. You also get a library of 30 @ functions tailored to project management. With these tools, you can play "what if" with deadlines, durations, and costs, just as you would with other variables in any other worksheet.

Project Calc determines the critical path for a project and computes early and late start and finish dates for each task involved, as well as slack time for noncritical activities. It can depict a project's schedule in Gantt and PERT charts and produce tables showing deadlines and costs.



WordStar Professional 5.0 includes more than 300 new features, such as pulldown menus and desktop publishing page-formatting features. You can split the screen into two resizable horizontal windows to edit two documents at once.



If You're Using Any Of These Word Processors, You Need RightWriter.[®]

**RightWriter Checks Grammar, Style, Usage,
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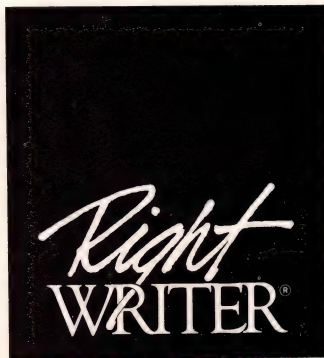
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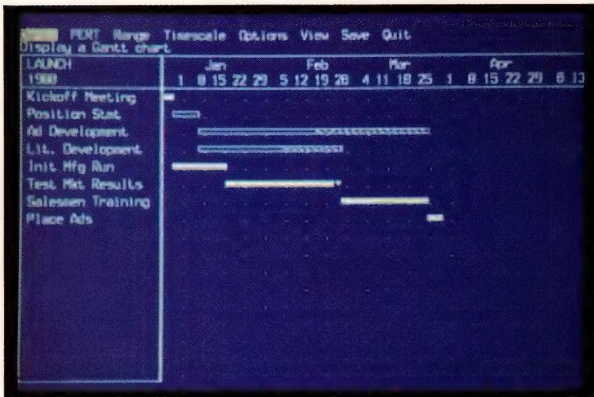
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Project Calc (shown here) and Decision Analyst let you use PERT and Gantt charts within your Lotus 1-2-3 worksheets to create alternate project scenarios.

Decision Analyst lets you draw a decision tree linked to your spreadsheet so that you can graphically analyze alternatives in a model, thus automating a helpful but often cumbersome decision analysis technique.

You use a built-in graphics editor to construct your tree on the screen. You can specify a value for each branch, or alternative, and supply that value to any cell in your spreadsheet. You can then recalculate the spreadsheet to obtain the outcome you can expect from choosing a particular alternative. During this process, you can flip back and forth between the tree and your spreadsheet.

Project Calc and *Decision Analyst* require 1-2-3 release 2, since only that version has the 1-2-3 *Add-in Manager*. They also need 140K and 55K, respectively, in addition to the 21K the *Add-in Manager* requires. *Project Calc* is \$149.95; *Decision Analyst* is \$99.95.

Frontline Systems,
P.O. Box 7408-P1, San Francisco, CA 94120;
800/451-0303 ext. 55,
916/677-7171.

PC Password

Software file encryption schemes generally can be defeated by a good programmer using common programming utilities. For the ultimate in security, Computer Commodities offers its PC Password add-on board. PC Password keeps its encryption algorithm in an EPROM chip on a \$149.95 half-card that fits in any 8-bit slot with a one-way screw. PC Password takes over at the BIOS stage; it doesn't let the computer boot until you enter the password. In order to defeat it, the board must be removed with a special screwdriver. A sticker affixed to the cabinet will be destroyed if the board is removed, alerting you to the break-in.

Each board comes with a unique password and software to set up a new password as often as you wish. Files and directo-

ries can be locked one by one. You also can disable your computer while it's still running and unlock it again with the password. Computer Commodities USA, 7127 Shady Oak Rd., Minneapolis, MN 55344; 612/942-0992.

Lotus 1-2-3 Video Training

With its installed base growing by a million copies each year, 1-2-3 is gaining followers faster than a television ministry. Many of these converts need extensive training in the discipline, and what better medium for the purpose than television?

SoftVision has tapped the talents of scriptwriters and video education specialists to develop a 1-2-3 training program that entertains as it instructs. The 60-minute program simulates a real-

world business situation in which the protagonist must quickly produce a spreadsheet for his boss. He accomplishes the task with the help of a teacher, who performs magical feats in the form of 1-2-3 @ functions.

Along with the cassette, SoftVision supplies a workbook and a disk-based training program to let viewers implement what they are learning at their own pace. The SoftVision curriculum doesn't cover every 1-2-3 function but rather focuses on developing a basic comprehension of spreadsheets and the necessary skills to complete an expense budget. Available in both VHS and Beta formats, the cassette sells for \$449 and is accompanied by a 5¼- or 3½-inch disk. Additional student kits with workbook and disk cost \$39 each. SoftVision, 140 Wood Rd., Braintree, MA 02184; 617/849-3551.

UPDATE

Professional Write 2.0, Professional File 2.0

Software Publishing has improved the file compatibility features of two members of its *Professional* series. *Professional File 2.0* reads the native .DBF data files and .DBT memo files of Ashton-Tate's *dBASE* as well

as reading and writing delimited and fixed-width ASCII files. The package now also includes file indexing, plus improved formula and calculation abilities. Although you can't keep more than one file open at a time, you do gain quasi-relational capabilities because you can search across multiple closed files.

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- Reversing journal entries

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- Open item or balance forward customers
- Up to 14,400 customers
- Supports partial payments
- User-defined terms codes and aging periods
- Automatic transactions with monthly, bi-monthly, quarterly, semi-annual, and annual frequency options

Accounts Payable

- Up to 14,400 vendors
- Partial payments of invoices
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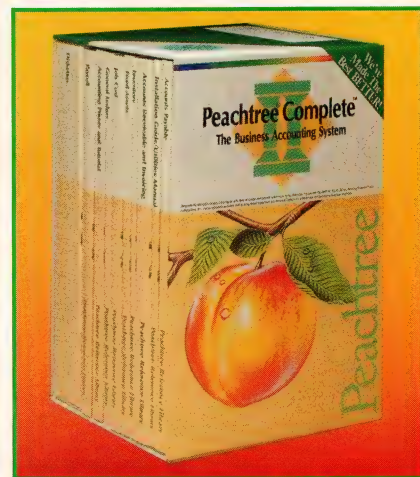
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*InfoWorld, December 1987.

Hardware Specifications: Requires PC/MS-DOS version 2.0 or higher with 384K of usable memory and a minimum 10 MB hard disk. For use with the IBM® PC, PCXT, PCAT, Personal System/2™ and compatibles. 3½" media optionally available. Not copy protected.

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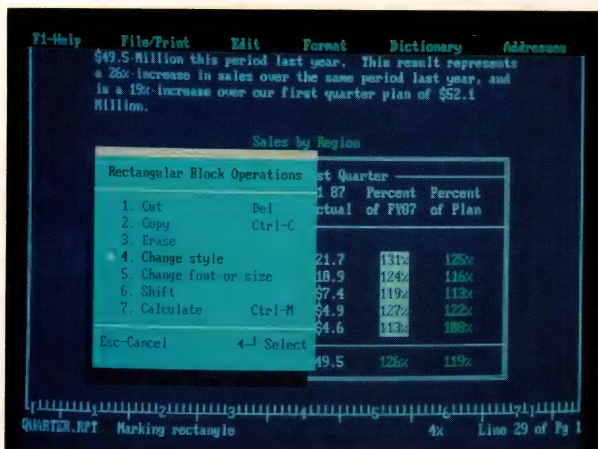
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Software Publishing's Professional Write 2.0 lets you use multiple fonts selected from a menu of popular fonts, including those for Hewlett-Packard LaserJet and PostScript printers.

Professional File 2.0 now supports conditional statements as well as time and date calculations and incorporates a menu-driven applications generator for creating executable files complete with custom menus. The program retails for \$299; upgrades cost \$75.

Professional Write 2.0 also has enriched import/export facilities. It automatically imports files from *WordPerfect 4.2*, *MultiMate Advantage II*, *Microsoft Word 3.0*, and *WordStar Professional 4.0*, among others, and can save its own files in those formats. It reads the .WK1 and .WKS files of 1-2-3 and can do a direct mail merge with *dBASE III* files at print time.

Professional Write 2.0 lets you use multiple fonts in a document. Simply mark your text and select

the appropriate typeface from a menu of popular fonts, including those for the Hewlett-Packard LaserJet series and PostScript printers. Moreover, *Professional Write 2.0* provides extensive file sorting and searching, including the ability to search within the files on a subdirectory for a specific text string.

Professional Write 2.0 sells for \$199, with upgrades available for \$50. Both programs require 512K of memory and DOS 2.00 or a later version. Software Publishing Corp., 1901 Landings Dr., Mountain View, CA 94039; 415/962-8910.

Framework III

Ashton-Tate's *Framework* integrated productivity software has added electronic mail capability, enhanced its outliner, and boosted import/export functions. *Framework III* automatically imports and exports files to 1-2-3 release 2.01 and *WordPer-*

fect, among other popular packages. It provides closer compatibility with *dBASE*, is compatible with the Lotus/Intel/Microsoft (LIM) 4.0 Expanded Memory Specification (EMS), and has sped up the recalculation of spreadsheets by letting you recalculate selected regions.

Framework III has a built-in E-mail system based on the Message Handling Service file transfer paradigm from Action Technologies, which is also supported by Novell's *Netware*. Other improvements include point-and-shoot selection of screen colors and word processing enhancements, including a capacity for multiple columns with automatic snaking of copy and a thesaurus containing 40,000 root words. Moreover, you can run other applications or issue DOS commands from within the program, and

Framework III saves memory space by "rolling out of memory," except for a 10K kernel. *Framework III* sells for \$695 and requires 640K and DOS 2.10 or a later version. A five-user network pack sells for \$995 and can be expanded with single-user copies. Ashton-Tate, 20101 Hamilton Ave., Torrance, CA 90502-1319; 213/329-8000.

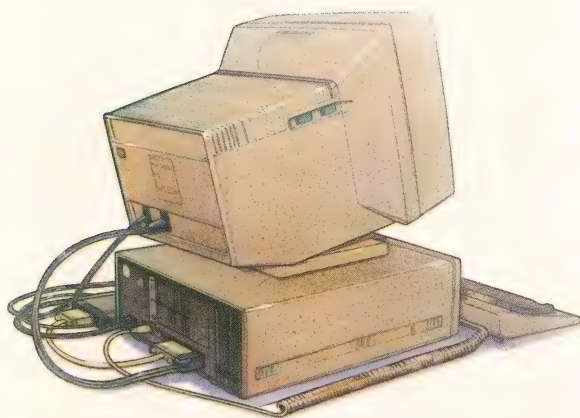
Epson Equity II+

Epson America has upgraded its small-footprint IBM AT compatible with a faster 80286 microprocessor offering switchable clock speeds of 8 MHz and 12 MHz in a compact 15.7-by-16.3-by-6-inch cabinet.

The Equity II+ comes standard with 640K of memory expandable to



The AT-compatible Epson Equity II+ has a small footprint and adds a faster 80286 microprocessor with switchable clock speeds of 8 MHz and 12 MHz.



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15.5MB; a 1.2MB, 5¼-inch floppy drive; and six full-size expansion slots, including three 16-bit and three 8-bit slots. The Equity II+ also features a battery-backed built-in clock/calendar, a parallel and a serial port, a 101-key, AT-style keyboard, and a 110-watt power supply. Epson bundles in DOS 3.30, GW BASIC, and Epson utility software with a hard disk cache.

The Equity II+ sells for \$1899 in a single-floppy configuration or \$2999 with the addition of a 40MB hard disk. Video choices include a \$149 MGA or a \$299 EGA board and either a \$149 monochrome, \$449 RGB, or \$599 EGA monitor. Epson America, 2780 Lomita Blvd., Torrance, CA 90505; 213/539-9140.

EasyCAD2

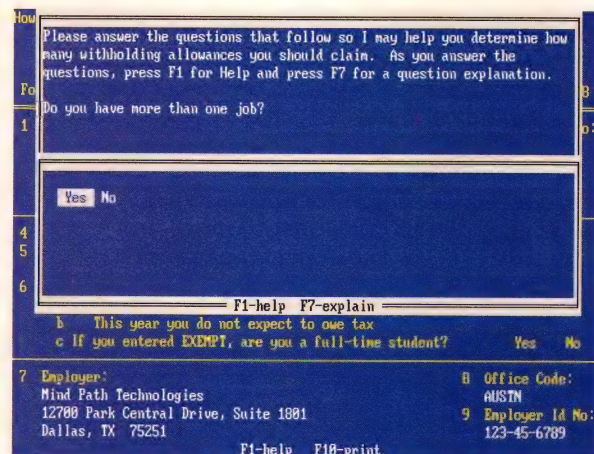
Evolution Computing has doubled the number of features in its low-cost CAD package, *EasyCAD*, adding pattern fill even for stretched polygons and making it possible to select line styles from pop-up dialog boxes. *EasyCAD2* has been completely rewritten in assembly language for enhanced performance and faster regeneration of complex drawings. You can select colors for shapes and lines from an on-screen palette at any

time the program is in use and use as many as 16 colors simultaneously from a palette of 256. Up to 256 design layers—say, for circuit board design—can be hidden or shown and locked or unlocked.

EasyCAD2's macro language has been enhanced to better automate complex or repetitive tasks, and its menus can be defined by the user. Output is read/write compatible with *AutoCAD*, *VersaCAD*, and other CAD packages. *EasyCAD2* is compatible with the LIM 4.0 EMS, runs in a *Microsoft Windows* window, and requires 512K of memory and two floppies, although a hard disk is recommended. It sells for \$169.95. Evolution Computing, 437 S. 48th St. #106, Tempe, AZ 85281; 602/967-8633.

Page Reader 2.0

Saba Technologies has improved the throughput of Page Reader, its handheld optical character recognition (OCR) scanner. Version 2.0 of Page Reader handles about 40 percent more draft dot matrix fonts, and its data entry is 25 percent faster than the original version. Page Reader 2.0 can take in about a page per minute, the equivalent of 400 words per minute. It has a more intuitive user interface, can deal with more complex document layouts, and is compatible



Brown Bag's MindReader version 2.0 gains a new interface. This word processor with an artificial intelligence engine suggests appropriate words and phrases as you type.

with TIFF, the graphics file format used by Aldus *PageMaker* and other *Windows* desktop publishing programs.

Page Reader 2.0 can read multicolumn text, outlines, tables, and lists. The device, which requires 640K of memory, DOS 2.10 or a later version, and a hard disk, retails for \$1299. Current registered owners will receive the software update for a \$7.50 handling fee. Saba Technologies, 9300 W. Gemini Dr., Beaverton, OR 97005; 503/626-7050.

MindReader

Brown Bag Software has added a bar interface along the top of the screen with pulldown command menus and context-sensitive help to version 2.0 of its *MindReader* word processor. *MindReader*, which includes an artificial intelligence engine to suggest appropriate words and phrases as you type, employs *WordStar*-

like editing commands and an interface that Brown Bag compares to its *PC-Outline*. Menus can be bypassed altogether for faster editing. The more you use the program, the more of your often-used words and phrases *MindReader* adds to its lexicon.

MindReader 2.0 also gains larger file capacity, user-definable colors, and full DOS path support. The program includes a real-time spelling checker, mail merge features, line drawing capability, a name and address data base, and a calculator. A shareware product, *MindReader 2.0* is distributed free of charge to those who wish to try it, but a \$54.95 registration fee is asked of those who continue to use it. The vendor will send a trial copy for a \$10 postage/handling charge. Brown Bag Software, 2155 S. Bascom Ave. #114, Campbell, CA 95008; 800/523-0764, 800/323-5335 California. ●

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Business-Class ATs

With prices dropping and performance rising, AT-clone buyers can be choosers, not beggars.

PC World evaluates five high-speed, low-end 80286 systems.

*TJ
Byers*



MARK JOHANN

Sometimes (usually around 4:30 on a bad Monday afternoon), you get the impression that the quality of life is on a relentless downhill slide. Happily, one area where optimism is definitely appropriate is bargain-basement computing. Month by month, reliable systems like 80286-based AT clones seem to get faster and cheaper.

In fact, high-speed 80286 machines using fast RAM and running without wait states are rapidly approaching the performance of low-end 80386 systems. Assuming you don't need *Windows/386* or other 80386-specific software, one of the new AT clones can handle all your business computing with amazing speed.

How much 286 can you get for the buck? To find out, *PC World* collected five high-performance AT clones, all with clock speeds of at least 10 MHz, all priced under \$2000. The systems were ordered in a minimal, money-saving configuration: 1MB RAM, a 1.2MB floppy drive, a 40MB or higher-capacity hard disk, one parallel and one serial port, a 101-key keyboard, and a monochrome video adapter and monitor. Each manufacturer put together the best package it could for the price. The contest included the Blackship 286, the Micro 1 286, the TBS International 286 Turbo Plus, the Fivestar 286, and the Clone Technologies AT-1.

The systems had many features in common. All five were housed in standard-AT-size boxes; no compact footprints here. All sported front-panel reset buttons, tilt-and-swivel monitor stands, switchable dual-speed CPUs (with front-panel LEDs to indicate the speed), and 80287 math coprocessor sockets, and all could use memory between 640K and 1MB for extended or expanded RAM. Four out of five systems came with two parallel ports, five half-height drive bays, two 8-bit and six 8/16-bit expansion slots, and a front-

panel button to toggle between low-speed and turbo mode.

How did performance compare? While raw clock speed is a factor, throughput is a truer measure of performance—and CPU clock speed is only one of three factors that affect it. The other two are wait states (see the sidebar “Waiting for Performance”) and hard disk access speed (see “The Ultimate System Buyers’ Guide,” *PCW*, January 1988). Nonetheless, it should come as no surprise that in throughput tests conducted by National Software Testing Laboratories (NSTL), the 12-MHz, no-wait-state TBS was the big winner, while the 10-MHz Clone AT-1 came in last.

For this roundup, however, cost was just as important as speed—and when price was factored in with performance, three systems emerged with laurels: The Blackship took top honors, while the Micro 1 and the TBS tied for second place.

Blackship 286

The \$1755 Blackship 286 runs at 12 MHz (switchable to 6 MHz), but it uses relatively slow, 120ns RAM chips that require the 12-MHz CPU to run at one wait state. As a result, it came in fourth overall in the speed events—but in company this fast, fourth place isn't that bad. In fact, the Blackship delivers more-than-adequate performance, and its price/performance ratio easily justifies *PC World's* Best Buy recommendation.

The Blackship includes quite a few attractive features, including a fast (28ms), sturdy, 44MB Seagate hard drive and a well-designed Data Bank motherboard. The system comes with two serial ports: a 9-pin type and

The 12-MHz Blackship 286 (far left) offers a winning combination of price and performance. Its latest version includes faster RAM and higher performance.

FEATURES EVALUATION

Cheap ATs

Blackship's 286 offers the most impressive price/performance ratio, but the Micro 1 and the TBS are almost as compelling.

	Blackship 286	Micro 1 286	TBS 286 Turbo Plus	Fivestar 286	Clone AT-1
● Yes ○ No					
Standard features					
Price ¹	\$1755	\$1950	\$1999	\$1995	\$1995 ²
CPU	286	286	286	286	286
Clock speed (MHz)	6/12	8/12	6/12	6/10	6/10
Built into motherboard					
Parallel ports	○	○	○	○	○
Serial ports	○	○	○	○	○
Floppy disk controller	○	○	○	○	○
Video adapter	○	○	○	○	○
Monitor size (inches)	14	14	14	14	12

Memory capacity

Amount shipped with unit	1MB	1MB	1MB	1MB	512K
Maximum installable on motherboard	1MB	1MB	1MB	1MB	1MB

Expandability

8/16-bit expansion slots	6	5	6	6	6
8-bit expansion slots	2	3	2	2	2
Slots occupied	3	4	3	3	3
Maximum number of half-height drives	5	4	5	5	5
120MB or larger hard disk available from vendor	●	●	●	●	○

Ergonomic design

Front-panel reset button	●	●	●	●	●
Front-panel on/off switch	○	○	○	○	○
Front-panel keyboard socket	○	○	○	○	○
ROM-based setup software	○	○	○	○	○
Tilt-and-swivel monitor	●	●	●	●	●
Compact footprint	○	○	○	○	○
Complete documentation	●	●	●	●	●

¹ Price based on 1MB RAM, 1.2MB floppy drive, 40MB hard drive, one parallel and one serial port, monochrome video card and monitor.

² Price includes only 512K RAM.

a conventional 25-pin RS-232C. An enhanced AT-type keyboard from Key Tronic—the best on the market—and a 14-inch amber monitor from Quimax with good, crisp characters round off the Blackship's package of winning accessories.

Even in its one-wait-state configuration, the Blackship is a compelling deal—and the news gets better. Since the review unit was delivered to *PC World*, Blackship has begun shipping this system with 80ns RAM, allowing zero-wait-state operation. This should boost performance right up to the level of the overall speed event winner, the TBS International, making the Blackship 286 impossible to resist.

EXECUTIVE SUMMARY

Blackship 286

AT-compatible system



This 12-MHz machine with a speedy 42MB hard disk provides the best dollar-for-dollar value of any unit in the roundup. With faster RAM now included at no extra cost, the Blackship has even more to offer.

Memory capacity	●			
Expandability	●			
Ergonomic design			●	
Performance		●		
Overall value	●			

EXCELLENT
GOOD
FAIR
POOR

Micro 1 286

Micro 1's 286 is something of a speedster, taking second place overall in the performance events. Its throughput was a little slower than the TBS's, and the Micro 1 is less expandable—but it has a faster motherboard and at \$1950 is also slightly cheaper. Go choose! The only fair solution was to declare a tie for second place.

The Micro 1 is an 8/12-MHz system, equipped with a 49MB CTI hard disk. It comes with the same excellent Key Tronic enhanced keyboard as the Blackship and a 14-inch, flat-screen, Packard Bell amber monitor with a nice sharp image and handy controls. An included utility, *Softgraph*, allows the monochrome monitor to emulate CGA mode.

The Micro 1's expandability leaves some-

thing to be desired. The motherboard includes the standard eight expansion slots—three 8-bit and five 8/16-bit—but one 8-bit and one 8/16-bit slot are located behind the drive bays, making it impossible to put a full-length board into either. To make matters worse, four slots are already occupied with boards (compared to three in the other systems reviewed) due to separate floppy and hard disk controllers. And unlike the other systems reviewed, which can hold five half-height devices, the Micro 1's system unit can only hold four.

Although the Micro 1 took second place overall in the speed trials, its 12-MHz, zero-

EXECUTIVE SUMMARY

Micro 1 286

AT-compatible system

This 12-MHz racer is the second-fastest machine in the roundup. Its slow hard disk holds it back a bit, and it is less expandable than the other systems here, but its fast motherboard and relatively low price are impressive enough to tie for second place.

Memory capacity	●			
Expandability		●		
Ergonomic design			●	
Performance		●		
Overall value	●			
	EXCELLENT	GOOD	FAIR	POOR

wait-state motherboard, with 80ns memory, is the fastest of any system in the roundup (based on NSTL's processor-intensive 1-2-3 tests). What drags down throughput is the 33ms hard disk.

With a faster drive installed (and there's nothing to stop you from putting one in), the Micro 1 would probably lead the pack—although you'd end up paying slightly more than \$2000. Alternately, if you can live with a 20MB, 33ms drive, the price plummets to a remarkably low \$1615. Even without a disk transplant, though, this is a hot machine.



The 12-MHz Micro 1 286 scores a speedy second-place performance rating, despite a relatively slow 49MB hard disk. And while its \$1950 price tag is fairly close to the upper limit of the survey, the system includes an excellent 14-inch flat-screen monitor.



The 12-MHz TBS Turbo Plus is the speediest 286 machine in the roundup. 80ns RAM allows the CPU to run without wait states. Its \$1999 price is high but includes a fast 44MB Seagate hard disk and an outstanding 14-inch paper-white monitor from CTX.

NSTL TEST REPORT

Cheap ATs

The Micro 1 places first in the processor-intensive 1-2-3 benchmark, but overall performance figures put the TBS in the top slot, followed by the Micro 1.

WordStar Professional

Micro 1 286	83
TBS 286 Turbo Plus	94
Fivestar 286	103
Clone AT-1	107
Blackship 286	110

dBASE III Plus

TBS 286 Turbo Plus	155
Fivestar 286	166
Micro 1 286	170
Blackship 286	173
Clone AT-1	220

1-2-3

Micro 1 286	26
TBS 286 Turbo Plus	27
Fivestar 286	31
Clone AT-1	32
Blackship 286	34

Lattice C Compiler

TBS 286 Turbo Plus	80
Micro 1 286	84
Blackship 286	91
Clone AT-1	91
Fivestar 286	92

seconds 0 40 80 120 160 200

All machines tested had a minimum configuration of 1MB of RAM and a 40MB hard disk, with the exception of the AT-1 from Clone Technologies, which was shipped with 512K of RAM; all machines were tested with a monochrome adapter and without a coprocessor.

WordStar Professional

Although disk access plays a small part in this benchmark, processing and memory access speeds are the most significant factors. The test measures the time required to perform four operations on a 15,364-word document.

dBASE III Plus

Disk access speed is the most significant factor for this benchmark. The test measures the time to produce a report based on a three-file join, select, and sort.

1-2-3

Because no disk access is required, this benchmark depends almost entirely on the processing and memory access speeds of the systems. In this test, a 1-2-3 macro executes a series of recalculations within a 50-by-50-cell matrix.

Lattice C Compiler

In this benchmark, the sequential disk access rate is the most important factor. Applications such as file managers commonly rely on this type of disk access. The benchmark measures the time required to compile and link two 1000-line programs and is performed automatically using a DOS batch file.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

TBS International 286 Turbo Plus

The 12-MHz TBS 286 Turbo Plus won the speed trials hands down, but fastest isn't always best. Given the Micro 1's faster motherboard and slightly lower price, a dead heat was declared for second place between the \$1999 Turbo Plus and the \$1950 Micro 1.

The system comes with the same fast, 44MB Seagate hard disk used in the Blackship, an excellent Focus Electronics enhanced keyboard with a very nice touch, and a large, 14-inch paper-white monitor from CTX that is a viewing pleasure (see "View-

EXECUTIVE SUMMARY

TBS International 286 Turbo Plus

AT-compatible system

The TBS International 286 Turbo Plus shares second-place honors with the Micro 1. It scored the top speed rating overall in the roundup. It's virtually identical to the Blackship 286 test unit—except for faster RAM and a price tag that's \$250 higher. This is an excellent system with a good price, but why pay more than you have to?

Memory capacity	●			
Expandability	●			
Ergonomic design			●	
Performance	●			
Overall value		●		
	EXCELLENT	GOOD	FAIR	POOR

ers' Choice: 13 Monochrome Monitors" in this issue). CPU speed is toggled with a slide switch located, rather inaccessibly, at the rear apron of the cabinet.

This 6/12-MHz system is built around the same Data Bank motherboard as the Blackship 286. While the Blackship review unit used 120ns RAM chips, the Turbo Plus contained 80ns chips that allowed its CPU to run at zero wait states—which is why it sprinted past the Blackship in NSTL's

throughput events. Now that the Blackship comes with 80ns chips too, there should be no difference between them—except the extra \$250 you'll spend for the TBS. Need we say more?

Fivestar 286

The Fivestar 286 is not cheap; at \$1995 it costs about the same as the much higher performance 12-MHz TBS. What Fivestar sells you is a fairly typical 10-MHz AT clone that mimics an IBM to the letter. It placed third overall in the speed trials—impressive performance for a 10-MHz machine, but in a world with 12-MHz machines for less money, who cares? Furthermore, since it already runs at zero wait states, there's no way to speed it up short of going to a 12-MHz motherboard. What you see is what you get.

The Fivestar comes with a swift (28ms), 44MB Seagate hard drive; a Hercules Graphics Card (note: not the HGC Plus), and a poor-quality, 14-inch paper-white Xtron monitor with a fuzzy image that's noticeably inferior to the monitors of the other clones reviewed (see "Viewers' Choice: 13 Monochrome Monitors" in this issue). The keyboard is the same outstanding Key Tronic

NSTL BENCHMARK TESTING

The exclusive test facility for PC World, **National Software Testing Laboratories (NSTL)**, is an independent organization that specializes in evaluating personal computer hardware and software. A recognized pioneer in state-of-the-art test design, **NSTL** believes that the most useful benchmark tests measure how well products perform when executing typical business tasks. **NSTL** testers follow detailed test plans that simulate normal operating conditions. A controlled testing methodology ensures objective, accurate, and consistent results and gives consumers a sound basis for making purchase decisions. **NSTL** publishes its test results in *Software Digest Ratings Report®* and *PC Digest™*. Neither publication accepts advertising. **NSTL** is located in Philadelphia, Pennsylvania.

unit provided with the Blackship and the Micro 1.

The sturdy PC&C horizontal motherboard is made in Taiwan, uses 120ns memory chips that allow the 10-MHz CPU to run at no wait state, and can be throttled down to 6 MHz if necessary. It includes a rechargeable clock battery; if it runs down, you can simply leave the system on overnight, and the battery will replenish itself.

The Fivestar 286 is a less-than-overwhelming value: a 10-MHz system that runs slower (and costs more) than the 12-MHz Mi-

WAITING FOR PERFORMANCE

What is a wait state? What is the CPU waiting for? What impact does a wait state have on performance?

At the heart of a personal computer is the system clock, a set of integrated circuits that produces a steady clock tick. The system clock determines the "speed" of your computer: 8 MHz, 12 MHz, and so on. With every click of the system clock, the CPU can execute one step of an instruction. The faster the CPU, the more steps it can perform in a given amount of time. RAM chips are also rated for speed—the time they require to respond correctly to a read-data request.

If a PC uses a fast system clock and slow (read cheap) RAM, the CPU can execute an instruction before the result of a previous read-data instruction is available. This is clearly a disaster. A wait state—a momentary pause, equal to one clock tick, in the execution of instructions—inserted by the system hardware just before each read-data instruction, keeps fast processors from outrunning slow memory.

RAM access time is rated in billionths of a second, or nanoseconds (ns). A chip rated at 150ns, for instance, takes longer to stabilize than one rated at 100ns. (RAM chips that stabilize faster are generally more expensive.) For the CPU to run at 10 MHz with no wait

states, RAM chips must be 120ns or faster; slower RAM will require the introduction of one wait state. At 12 MHz, memory must be rated at 100ns or faster for no-wait-state operation.

Predictably, wait states also slow processing throughput. Introducing a wait state drops throughput by about 25 percent. So if you're shopping for a fast computer, you're really in the market for *throughput*—the time it takes the CPU to process a given amount of data—and that depends as much on wait states as it does on clock speed.

—TJB



The 10-MHz Fivestar 286 costs \$1995 but fails to deliver performance to match the similarly priced 12-MHz TBS Turbo Plus. The system includes a rechargeable clock battery, a Hercules Graphics Card, and an unimpressive 14-inch paper-white monitor from Xiron.



The Clone Technologies AT-1 took last place in the speed trials, comes with only 512K of RAM, and costs no less than \$1995. A 40MB Miniscribe hard disk, a plain-vanilla 12-inch monitor, and a flaky Chicony keyboard are part of this dubious package.

cro 1—and has a shoddy monitor. (Beware: Fivestar sells another AT clone, the FS-286, that uses a backplane instead of a horizontal motherboard. Not only is the FS-286 slower, it's more expensive—so be sure you know which machine you're buying.)

Clone Technologies AT-1

This is not an impressive system. In addition to a high price and a last-place overall showing in the speed event, the 10-MHz AT-1 came with a malfunctioning keyboard and a skimpy helping of RAM. Although the 10-MHz, zero-wait-state VIP motherboard holds 1MB of RAM, the system was shipped with only 512K.

EXECUTIVE SUMMARY

Fivestar 286

AT-compatible system

The Fivestar 286 is very fast—for a 10-MHz machine—and it has many good features. Nonetheless, you can get higher performance for less money with the 12-MHz Micro 1.

Memory capacity	●			
Expandability	●			
Ergonomic design			●	
Performance		●		
Overall value			●	
	EXCELLENT	GOOD	FAIR	POOR

The \$1995 Clone AT-1 includes a 40MB MiniScribe hard disk that claims 40ms access time; it proved to be a slow-motion clunker that sounded like a transmission looking for an AAMCO garage. You also get a flaky enhanced AT keyboard from Chicony that prevented the system from booting at 6 MHz. (When the Key Tronic keyboard was substituted, there was no problem.) The monitor is a plain-vanilla, 12-inch amber unit from Packard Bell.

EXECUTIVE SUMMARY

Clone Technologies AT-1

AT-compatible system

Offering only 512K RAM, a keyboard that refused to let the system boot at 6 MHz, and a cheap 12-inch monitor, this poor excuse for an AT is a must to avoid—at any price.

Memory capacity				
Expandability				
Ergonomic design				
Performance				
Overall value				
	EXCELLENT	GOOD	FAIR	POOR

There is one nice touch. Instead of a rechargeable clock battery, the Clone AT-1 uses a large capacitor that holds a charge for up to a month. If it runs down, you can recharge it by leaving the system on overnight—and unlike a rechargeable battery, the capacitor never wears out.

Clone Technologies expects you to fork over top dollar for this dubious system. Fortunately, you can do a lot better.

Heroes of the AT Olympiad

When the dust settles, three systems emerge as true heroes: the top-rated Blackship 286 (\$1755) and the second-place tie-winners Micro 1 286 (\$1950) and TBS International 286 Turbo Plus (\$1999). You won't go wrong with any of these systems.

The Fivestar 286 fails to make the winner's circle; there is nothing wrong with it, except that you can get faster performance for less money. Last and definitely least is Clone Technologies' AT-1, checking in with short memory, a bum keyboard, and a hard disk that wheezes while it works.

With performance that would have pinched your pocketbook only a few years ago, the best of these bargain-priced machines provide real cause for celebration. The work time they'll save you will turn even a blue Monday into a good-news day. ●

TJ Byers is a contributing editor for PC World.

WHERE TO BUY

Blackship 286

Blackship Trading Co.
385 Oyster Point Blvd.
#110
South San Francisco, CA
94080
800/654-7955

List price: with 1MB zero-wait-state 80ns RAM, 101-key keyboard, two parallel and two serial ports, 1.2MB floppy disk drive, 44MB hard disk drive, Hercules-compatible video board, 14-inch amber monochrome graphics monitor \$1755

Warranty: one year parts and labor

Extended warranty: \$210, available through Data Bank

Technical support: no toll-free number, 9-5

Clone Technologies AT-1

Clone Technologies
13522 W. 107th St.
Lenexa, KS 66215
913/469-0400

List price: with 512K zero-wait-state 120ns RAM, 101-key keyboard, two parallel ports and one serial port, 1.2MB floppy disk drive, 40MB hard disk drive, Hercules-compatible video board, 12-inch amber monochrome graphics monitor \$1995

Warranty: one year parts and labor

Extended warranty: \$199 per year

Technical support: no toll-free number (collect calls accepted), 9-5

Fivestar 286

Fivestar Computers
1621 W. Crosby #112
Carrollton, TX 75006
214/242-7000

List price: with 1MB zero-wait-state 120ns RAM, 101-key keyboard, two parallel ports and one serial port, 1.2MB floppy disk drive, 42MB hard disk drive, Hercules Graphics Card, 14-inch paper-white monochrome graphics monitor \$1995

Warranty: one year parts and labor

Extended warranty: none

Technical support: toll-free number, 9-5

Micro 1 286

Micro 1
557 Howard St.
San Francisco, CA
94105
415/974-5439

List price: with 1MB zero-wait-state 80ns RAM, 101-key keyboard, one parallel and one serial port, 1.2MB floppy disk drive, 49MB hard disk drive, Hercules-compatible video board, 14-inch amber monochrome graphics monitor \$1950

Warranty: one year parts and labor

Extended warranty: \$200 per year from National Computer Systems

Technical support: no toll-free number, 9-5

TBS International 286 Turbo Plus

TBS Int'l
20 Main St.
Ashland, MA 01721
617/881-7322

List price: with 1MB zero-wait-state 80ns RAM, 101-key keyboard, two parallel ports and one serial port, 1.2MB floppy disk drive, 42MB hard disk drive, Hercules-compatible video board, 14-inch white monochrome graphics monitor \$1999

Warranty: one year parts and labor

Extended warranty: \$300 for two years, \$500 for four years

Technical support: no toll-free number, 9-5

For more information, see Products Featured in This Issue.

XTs for Bargain Hunters

**Five XT clones set out to prove
that you can still find happiness
with an 8088.**

**Unexpectedly, the cheapest units
deliver the best performance.**

Although speedy 80286 and 80386 systems tempt buyers with 16- and 20-MHz speeds, most users have yet to push their 8088 systems to the limit. Many companies waste money buying ATs when less expensive XT compatibles would do just as well. XT clones are faster than ever, yielding 8-MHz to 10-MHz clock rates, and plenty of inexpensive expansion products can boost performance even further.

This review examines five XT clones ranging in price from \$1077 to \$1273.95: the Maxum Turbo XE from 47th Street Computer, the Plain Vanilla PC from PC Designs, the Standard Turbo/10 from CompuAdd, THE PC/10 from PC Network, and the Whole Earth Turbo System from Whole Earth Electronics.

Look-Alike Clones

The five PC XT clones tested are clearly commodity products—while price, performance, and ergonomic extras vary, components are often identical. For the sake of comparison, *PC World* requested similar configurations from all vendors, representing inexpensive yet complete computer systems. However, all the vendors offer numerous op-

tions for customizing your system. Prices for the most common items appear in the Where to Buy section at the end of this article. (Due to the rising cost of RAM at press time, prices are subject to change.)

For each unit tested, the sticker price includes 640K of RAM, a 360K half-height floppy drive, and an 85ms Seagate ST-225 20MB hard drive. The only exception is the Maxum Turbo XE, which came with a 65ms 40MB MiniScribe 3650 hard drive and 768K RAM. Also included are an amber monochrome monitor, a Hercules-compatible video adapter, DOS 3.20 or 3.30, an AT-style keyboard, a clock/calendar, one serial port, and at least one parallel port. Note, however, that manufacturers often substitute one brand of component for another—which may affect performance.

All the units except the Maxum offer Datatech DTK motherboards and use the ERSO BIOS. All provide eight expansion slots (six long and two short), and all but the Maxum leave five slots free (the Maxum leaves only four). Each system has an 8088

*Lewis
Perdue*



CPU switchable between 4.77 MHz and either 8 or 10 MHz, and each offers a socket for an 8087 math coprocessor. All have 135-watt power supplies and two empty half-height disk drive bays.

The Speed Gap

Performance tests by National Software Testing Laboratories (NSTL) show wide variations in the clones' performance. Overall, the Whole Earth Turbo and Standard Turbo/10 took the top two prizes, THE PC/10 was third, the Maxum Turbo XE fourth, and the Plain Vanilla PC lagged far behind.

Not surprisingly, the two slowest models lack 10-MHz operation, but other variations

come into play. The sluggardly Plain Vanilla PC depends on the older revision 5 DTK motherboard, while the others use revision 9. The faster units are equipped with version 2.40 of the ERSO BIOS (a public-domain BIOS distributed by the Taiwanese government); the slower PCs rely on earlier versions. All but THE PC/10 use Western Digital disk controllers, but data transfer tests reveal that the WX-1 version used by the Whole Earth is the fastest.

NSTL tests uncovered no software compatibility problems except with THE PC/10,

The Whole Earth Turbo System delivers fast performance and good ergonomics at a moderate price.



The Standard Turbo/10 is the least expensive machine in this group. Considering its speedy performance, the system is hard to beat.



The Maxum Turbo XE runs at a maximum clock speed of 8 MHz and, unlike the other clones, allows you to install up to 1MB of RAM on the motherboard.

and *PC World* discovered only a few gaffes in hardware compatibility. The Plain Vanilla had trouble with the AST Hot Shot accelerator board, and none of the systems ran with either the Intel or Quadram 80386 accelerator boards.

MARK JOHANN

Whole Earth Turbo System

At \$1153, the 10-MHz Whole Earth Turbo System is not only one of the least expensive systems tested but also one of the fastest, performing about 42 percent faster than an IBM PC XT. The Whole Earth's flawless operation and extensive panel controls mark it as a Best Buy.

The system arrived fully configured, and installation was easy. The unit's excellent panel controls add to the illusion that you're riding an AT. The cabinet contains a keylock, a reset button, and a speed indicator light, and it's the only unit with a convenient switch for toggling clock rates. The system

EXECUTIVE SUMMARY

Whole Earth Turbo System
XT compatible



As one of the top performers and the second least expensive unit evaluated, the Whole Earth Turbo deserves a firm thumbs-up.

Memory capacity	●			
Expandability	●			
Ergonomic design	●			
Performance	●			
Overall value	●			
EXCELLENT GOOD FAIR POOR				

came with a Samsung monochrome monitor; however, the 84-key BTC 5060 keyboard was somewhat mushy. The package included a disk of DOS utilities and special display drivers, as well as the *PC-Write* shareware word processor.

The combination of top performance, reasonable price, and easy setup are hard to beat. Despite the mushy keyboard, the Whole Earth Turbo is one of two highly recommended systems in this group.

Standard Turbo/10

At \$1077, CompuAdd's 10-MHz Standard Turbo/10 is the cheapest of the systems reviewed. Only a shade slower than the Whole Earth (and 42 percent faster than an IBM PC XT), the Turbo/10 finishes in a dead heat with the Whole Earth for first place in overall value.

Like the Whole Earth Turbo, the Turbo/10 is housed in an AT-style cabinet with a key-

EXECUTIVE SUMMARY

Standard Turbo/10

XT compatible



The Turbo/10 offers the lowest price and nipped at the Whole Earth's heels in performance. Although our review unit's floppy drive problems had to be fixed, the system is a good deal.

Memory capacity		●		
Expandability		●		
Ergonomic design		●		
Performance	●			
Overall value	●			
	EXCELLENT	GOOD	FAIR	POOR

lock, reset button, and speed indicator light, but you have to toggle clock rates with a hot key. The 101-key, AT-style Key Tronic keyboard, with its crisp touch, was the best tested. The Turbo/10 came with a Samsung monochrome monitor and several hard disk utilities, including *PC Fullbak*.

Unfortunately, the first Turbo/10 test unit was plagued with a floppy drive problem. Even after the drive, controller, and cable were replaced, the new drive still wouldn't work right. Replacing the CPU finally fixed matters.

While its floppy drive mishaps could prove significant, the Turbo/10 is nonetheless recommended. Its fast performance, low price, and superior keyboard make it a solid value.

FEATURES EVALUATION

XT Features Compared

Welcome to the me-too generation of XT clones. With so much in common, price and performance are paramount.

	Whole Earth Turbo System	Standard Turbo/10	Maxum Turbo XE	Plain Vanilla PC	THE PC/10
Standard features					
Price ¹	\$1153	\$1077	\$1274 ²	\$1208	\$1179
CPU	8088-1-p	8088-1-p	8088-2	8088-2	8088-1-p
Maximum clock speed	10 MHz	10 MHz	8 MHz	8 MHz	10 MHz
Parallel ports ³	2	2	1	2	2
Serial ports ³	1	1	1	1	1
Monitor	12 inch	12 inch	12 inch	12 inch	12 inch
Coprocessor support	8087	8087	8087	8087	8087

Memory capacity

Amount shipped with unit	640K	640K	768K	640K	640K
Maximum installable on motherboard	640K	640K	1MB	640K	640K

Expandability

8-bit expansion slots	8	8	8	8	8
Slots occupied	3	3	4	3	3
Maximum number of half-height drives	4	4	4	4	4

Ergonomic design

Front-panel reset button	●	●	○	○	●
Front-panel on/off switch	○	○	○	○	○
Key lock	●	●	●	○	●
Speed indicator	●	●	●	○	●
Speed toggle	●	○	○	○	○
Tilt-and-swivel monitor	●	●	●	●	○
Compact footprint	○	○	○	○	○
Complete documentation	●	●	●	●	●

¹ Price based on a 640K XT with a 20MB hard disk, a monochrome graphics monitor, and at least one serial and one parallel port—except for the Maxum Turbo XE, which came with 768K and a 40MB hard disk.

² \$1189.95 with 20MB hard disk.

³ Not built into the motherboard.

Maxum Turbo XE

The Maxum Turbo XE tested second to last in performance, registering just 37 percent faster than an IBM PC XT. The unit performed weakly despite its advanced compo-



The Plain Vanilla comes with an excellent keyboard, but its front panel is rather bare, and its price and performance aren't on a par with the other units'.



Priced about average for this group of clones, THE PC/10's keyboard has a rubbery feel, and the review units' components were problematic.

nents, including 128K of extended memory, a PC-II ADvance motherboard, and an Award BIOS. In addition, only a 65ms MiniScribe 40MB hard drive was available for evaluation with the unit, thus skewing the price (and perhaps performance scores on disk-intensive tests) slightly upward. For comparison's sake, with the 20MB Seagate drive, the Maxum would cost \$1189.95 rather than \$1273.95—the price of the 40MB system received.

The Turbo XE dwells in an AT-style cabinet with a keylock and turbo indicator lights. Toggling from 4.77 MHz to 8 MHz requires a

EXECUTIVE SUMMARY

Maxum Turbo XE

XT compatible

In spite of more advanced components, the Maxum was the second slowest unit evaluated. With its tired performance and inefficient slot configuration, it takes third place in this evaluation.

Memory capacity	●			
Expandability			●	
Ergonomic design		●		
Performance			●	
Overall value			●	
	EXCELLENT	GOOD	FAIR	POOR

keystroke combination. The unit's Vendex monitor is a dressed-up version of a basic Samsung unit, and the keyboard is the mushy BTC 5060.

The Maxum has eight expansion slots, but only four are open for use because the serial port requires its own expansion board, separate from the floppy controller. Worse yet, the serial board did not function at all and the hard disk crashed during tests. However, the second review unit's serial port worked just fine. In addition, the Maxum is the only unit tested that lets you upgrade to 1MB of RAM on the motherboard.

Despite its edge in memory expansion, the Maxum Turbo XE's mediocre 8-MHz perfor-

mance places it third in overall value. The unit's slot-wasting hardware design further prevents it from winning a strong recommendation.

Plain Vanilla PC

PC Designs' Plain Vanilla PC clearly lives up to its self-effacing moniker. Although it has a responsive keyboard, it was the slowest machine evaluated, straggling in last in every test. In its fastest mode (8 MHz), the Plain Vanilla was only 29 percent faster than the IBM PC XT, compared to 37 percent for the second lowest competitor. At \$1208, it was also one of the most expensive units tested.

The Plain Vanilla's panel is strictly plain vanilla; bereft of locks, controls, and lights, it's the only unit tested without a reset button. The 101-key, enhanced AT-style Maxi-

EXECUTIVE SUMMARY

Plain Vanilla PC

XT compatible

The Plain Vanilla was not only one of the most expensive units evaluated but the slowest by a long shot. Despite its responsive keyboard, it doesn't win our stamp of approval.

Memory capacity		●		
Expandability		●		
Ergonomic design			●	
Performance				●
Overall value				●

EXCELLENT

GOOD

FAIR

POOR

Switch keyboard is a plus, offering a firm touch. The system came with a Samsung monochrome monitor.

Installing the Plain Vanilla required a battery of hard disk utilities and plenty of experience. On the unit received, the hard disk refused to load due to the presence of a non-

NSTL TEST REPORT

Cheap XTs

The Whole Earth Turbo System and the Standard Turbo/10 pulled out ahead.

WordStar Professional

Standard Turbo/10	253
Whole Earth Turbo System	253
THE PC/10	261
Maxum Turbo XE	292
Plain Vanilla PC	321
IBM PC XT	497

dBASE III Plus

Maxum Turbo XE	368
Standard Turbo/10	375
Whole Earth Turbo System	377
THE PC/10	387
Plain Vanilla PC	437
IBM PC XT	541

1-2-3

Standard Turbo/10	98
THE PC/10	98
Whole Earth Turbo System	98
Maxum Turbo XE	109
Plain Vanilla PC	126
IBM PC XT	205

Lattice C Compiler

Whole Earth Turbo System	217
Standard Turbo/10	231
THE PC/10	238
Maxum Turbo XE	268
Plain Vanilla PC	276
IBM PC XT	412

seconds 0 100 200 300 400 500

All machines were tested with 640K of RAM and a 20MB hard drive, except for the Maxum Turbo XE, which had 768K of RAM and a 40MB hard drive; all machines were also tested with a monochrome adapter and without a coprocessor.

WordStar Professional

Although disk access plays a small part in this benchmark, processing and memory speeds are the most significant factors. The test measures the time required to perform four operations on a 15,364-word document.

dBASE III Plus

Disk access speed is the most significant factor for this benchmark. The test measures the time to produce a report based on a three-file join, select, and sort.

1-2-3

Because no disk access is required, this benchmark depends almost entirely on the processing and memory access speeds of the systems. In this test, a 1-2-3 macro executes a series of recalculations within a 50-by-50-cell matrix.

Lattice C Compiler

In this benchmark, the sequential disk access rate is the most important factor. The benchmark measures the time required to compile and link two 1000-line programs and is performed automatically using a DOS batch file.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

DOS partition. After several hours of running diagnostics and other utilities, however, the hard disk worked fine.

Although the Plain Vanilla offers a respectable keyboard, the unit cannot be recommended. Sluggish performance, a high price, and tricky installation conspire against it.

THE PC/10

Despite its 10-MHz operation, PC Network's THE PC/10 sits squarely in the middle on performance tests, running a hair slower than the Standard Turbo/10 and about 40 percent faster than an IBM PC XT. Priced about average at \$1179, it earns the lowest overall ranking, thanks to a rubbery keyboard and severe hard disk and display problems.

THE PC/10's cabinet has a reset button and a keylock. The 101-key, AT-style keyboard from Chicony Electronics has the worst touch of the models tested. The keys feel as if they were mounted with wads of chewing gum.

THE PC/10 was given two chances to pass muster and failed both times. The first unit received by NSTL had serious floppy disk problems, and the second was barely breathing. The original Cardinal MM1215A monitor would not hold a steady image. (At press time PC Network said it was no longer using the Cardinal.)

POWER TIP NO. 3

Searching dBASE III Plus Logical Fields

In dBASE III Plus, you can define logical fields whose values are either true or false (actually T or F). Since it's searching for only two characters, dBASE III Plus can search logical fields faster than it can search alphanumeric fields. Here's the proper syntax for searching on a logical field:

List for logical_field

or

List for .Not. logical_field.

Roy Moore

Director of Technical Support, Ashton-Tate

Torrance, California

EXECUTIVE SUMMARY

THE PC/10

XT compatible

THE PC/10 takes third place in performance, making it the slowest of the three 10-MHz systems. Severe hard disk and monitor problems in the review unit, along with a chintzy keyboard, combine to earn it the worst rating of the XTs tested.

Memory capacity		●		
Expandability		●		
Ergonomic design				●
Performance			●	
Overall value				●
EXCELLENT GOOD FAIR POOR				

The second system refused to recognize the Seagate hard disk, and further tests indicated that half the drive's sectors were bad. After a low-level format, the drive operated, but very slowly. Whether these problems were due to poor components or slipshod packing, it's enough to give one pause. Moreover, in NSTL software compatibility tests, THE PC/10's hard disk wouldn't boot when formatted with IBM PC-DOS 3.30, nor would it install that version's VDISK.SYS. Clearly, THE PC/10's disastrous performance disqualifies it from recommendation.

Low Cost, High Quality

If this crop of XT compatibles is any indication, price has little to do with performance. The Whole Earth Turbo is highly recommended because of its top-notch performance and reasonable price. The Standard Turbo/10 is less expensive than the Whole Earth system and is equally recommended, despite floppy drive problems with our review unit. The Maxum Turbo XE's extra RAM helps to place it third, but buyers should note that it leaves only four slots open for expansion. The Plain Vanilla PC is simply

too slow and limited for serious consideration, and THE PC/10 merits the lowest ranking due to its poor keyboard and damaged components.

Despite the remarkable similarity among XT clones, subtle differences can produce significant variations in performance. The faster of the reviewed models represent

sound values and give new life to the ever-expandable 8088-based XT. ●

Lewis Perdue is the editor and publisher of PC Management Letter and the author of Supercharging Your PC (Osborne/McGraw Hill, Berkeley, California, 1987).

WHERE TO BUY

Maxum Turbo XE

47th Street Computer
36 E. 19th St.
New York, NY 10003
800/221-7774

List price: with 768K, 360K floppy disk drive, MiniScribe 3650 40MB hard disk, DOS 3.20, Vendex (Samsung) monochrome monitor, game port, one serial and one parallel port, BTC 5060 keyboard \$1273.95

Accessories: Seagate ST-225 20MB hard drive \$289.95, Toshiba 720K 3½-inch floppy drive \$109.95, Toshiba 1.44MB 3½-inch floppy drive \$139.95, CGA adapter \$89.95, Thomson CGA monitor \$229.95, Paradise AutoSwitch EGA adapter \$149.95, Quadram EGA monitor \$469, Paradise VGA graphics adapter \$259, NEC MultiSync II (VGA) monitor \$579, Irwin 20MB tape backup \$409.95, Mountain 40MB tape backup \$379.95, Intel AboveBoard with 512K \$389.95

Warranty: one year parts and labor, carry in or ship in

Extended warranty: one additional year only, costs 18 percent of system price

Technical support: unlimited phone support, no toll-free number, M–Th 9:30–5, F 9–2, Sun 10–5

Other support services: buyer discounts on computer classes in New York City

Plain Vanilla PC

PC Designs
2500 N. Hemlock Circle
Broken Arrow, OK
74012
800/322-4872

List price: with 640K, 360K floppy disk drive, Seagate ST-225 20MB hard disk, Samsung monochrome monitor, one serial and two parallel ports, DOS 3.30, Maxi-Switch 101-key keyboard \$1208

Accessories: Seagate ST-225 20MB hard drive \$295, Seagate ST-238 30MB hard drive \$329, Seagate ST-251 40MB hard drive \$495, 360K floppy drive \$99, 720K 3½-inch floppy drive \$115, Hercules CGA adapter \$150, Samsung CGA monitor \$409, NEC GB1 EGA/CGA adapter \$335, Vega Video-7 Deluxe adapter \$215, Samsung EGA monitor \$409, Vega Video-7 VGA adapter \$319, Orchid Designer VGA adapter \$319, NEC MultiSync II monitor \$629, TEAC 40MB internal cassette tape backup \$545, TEAC 60MB internal cassette tape backup \$619, Wangtech 125MB internal cartridge tape backup \$969

Warranty: one year parts and labor, carry in or ship in

Extended warranty: none

Technical support: unlimited toll-free phone support, M–F 8–6

Other support services: user BBS (918/252-9137)

Standard Turbo/10

CompuAdd Corp.
12303G Technology Blvd.
Austin, TX 78727
800/531-5475

List price: with 640K, 360K floppy disk drive, Seagate ST-225 20MB hard disk, 12-inch Samsung monochrome monitor, one serial and two parallel ports, DOS 3.30, Key Tronic 101-key keyboard, PC Fullbak backup utility \$1077

Accessories: MiniScribe 3650 40MB hard drive \$395, 360K floppy drive \$99, 1.2MB floppy drive \$109, 720K 3½-inch floppy drive \$109; CGA monitor and adapter \$289; EGA monitor and adapter \$469; Vega Video-7 Deluxe adapter plus NEC MultiSync II monitor \$869; Paradise VGA adapter \$269; Vega Video-7 adapter \$299; NEC MultiSync II monitor \$679; Mountain 40MB internal tape backup \$389; Intel AboveBoard (with 512K) \$349

Warranty: one year parts and labor, carry in or ship in

Extended warranty: none

Technical support: one year toll-free phone support, M–F 8–7

Other support services: none

THE PC/10

PC Network
320 W. Ohio St.
Chicago, IL 60610-9934
800/621-SAVE,
312/280-0002

List price: with 640K, 360K floppy disk drive, Seagate ST-225 20MB hard disk, Cardinal monochrome monitor, DOS 3.20, one serial and two parallel ports, Chicony keyboard \$1179

Accessories: MiniScribe 3650 40MB hard disk drive with controller \$386, 1.2MB Mitsubishi floppy disk drive \$103, 360K floppy disk drive \$81, 720K 3½-inch floppy disk drive \$86, 1.44MB 3½-inch floppy disk drive \$103, color video adapter \$53.90, color monitor \$269, EGA board \$140, EGA monitor \$345, Orchid VGA board \$259, Princeton Ultrasync VGA monitor \$513, Intel AboveBoard 286 with 512K \$323, Irwin 20MB internal tape backup \$351

Warranty: one year parts and labor, carry in or ship in

Extended warranty: none

Technical support: unlimited, no toll-free number, M–F 9:30–4:30

Other support services: 15-day money-back guarantee, user BBS

Whole Earth Turbo System

Whole Earth Electronics
2990 Seventh St.
Berkeley, CA 94710
800/323-8080 outside California,
415/653-7758

List price: with 640K, 360K floppy disk drive, Seagate ST-225 20MB hard disk, Samsung monochrome monitor, one serial and two parallel ports, DOS 3.30, BTC 5060 keyboard \$1153

Accessories: MiniScribe 3650 40MB hard drive \$170, Seagate FT-251-1 40MB hard drive \$370, 1.2MB floppy drive \$159, 720K 3½-inch floppy drive \$119, 1.44MB 3½-inch floppy drive \$149, CGA board and monitor \$200, EGA board and monitor \$400, VGA board and monitor \$600, 40MB internal tape backup \$399, Intel AboveBoard (without memory) \$129

Warranty: one year parts and labor, carry in or ship in

Extended warranty: second year costs 7 percent of system price, third year costs 25 percent

Technical support: unlimited toll-free phone support, M–F 8–5

Additional support services: 30-day money-back guarantee

For more information, see Products Featured in This Issue.

Five Flat-File Favorites

Five flat-file data managers show their colors.

The spectrum ranges from simple file management to complex data analysis.

The first file managers were crude electronic bins with clunky user interfaces and a couple of ways to print lists and labels. Today many feature colorful, informative menus and a surprising array of search, sort, view, and report options. Some even borrow multifile powers usually associated with relational data managers like *Paradox* and *dBASE*.

Last month *PC World* reviewed Symantec's *Q&A 3.0*, a genial, multitasking program widely considered the best general-purpose file manager around. In this review, we round up five more entries—some addressing more specialized needs, others after a piece of *Q&A*'s extensive turf.

Each of the programs offers a menu-driven system for creating files, searching data, sorting records, and producing simple reports. Beyond these commonalities, the packages accommodate an intriguingly diverse set of users and applications—but there are limitations buyers should know about.

PFS: Professional File 1.01

PFS: Professional File doesn't pretend to be other than what it is—a capable flat-file manager. A mature, popular product, its interface is attractive and consistent. It sup-

plies the basics most beginners need: good tools for data entry and editing, quick searches, and simple columnar reports. The latest version offers memory caching for faster searches and sorts, and supports up to 64 sort keys in reporting mode.

Professional File's \$249 price is midrange, and its system requirements are modest: two disk drives and 256K of RAM. A simple installation procedure and lucid documentation simplify setup, and navigating the overlapping menus is a breeze. When you pull down a menu, you're confronted with just a few explicitly defined choices, and hot keys let you bypass menus altogether. If this isn't enough, *PFS*'s on-line help is superb.

Building a file is straightforward. *Professional File* automatically assigns field type and length according to data you key in. A useful set of editing features lets you insert blank lines and duplicate fields, pages, and entire forms. Field versatility is somewhat limited, though. The program provides automatic date stamping, but you're stuck with ANSI year-first format.

The program's error messages are precise and action oriented, and data can't easily be destroyed. However, data validation is limited; you can't restrict entries to a proper range, date, or time, nor can you require an entry.

*Ellen J. Sander
and
Marlene Nesary*

Quick searches, sorts, and reports are *Professional File's* forte. To select a group of records, you type the match criteria in a blank record and establish field priorities by number for sorts. Macros further speed these (and other) operations. You can't edit macros, but you can have them pause for user input.

Professional File's reporting powers are limited but well designed, offering list, mailing label, and cross-tabulation formats. The easy-to-use cross-tab report accommodates five kinds of summary fields: total, count, average, maximum, and minimum values. But *Professional File* can't accommodate or adjust to custom formatting.

Despite these limitations, *Professional File* is all the data base many users need. Quick reports and speedy performance make the program a pleasure to use. For the silent majority who use file management programs, *Professional File* is the best buy around.

PowerBase 2.3

If you're willing to part with \$349, *PowerBase* will take you closer to relational style and capability than any other program reviewed here. The program's multifile features are well implemented, and a first-rate zoom option lets you move quickly from file to file for viewing and reporting. However, to take advantage of these features, you'll have to think like a relational data base designer. You'll also need the patience of one as you wait for its slower-than-*dBASE* report generator to do its stuff.

Clear documentation, a tutorial disk, and a capable installation program make setup easy. The program requires 384K of RAM and two disk drives. *PowerBase* strings its



menus across the bottom of the screen, a status line along the top tells what file and mode you're in, and a help line provides orientation. Menu format is consistent, but keystroke routines are cumbersome. However, you can override keystroke choices with a command mode, which is smoother.

PowerBase is the only program of the five that requires you to declare field lengths, and you have to choose from the four field types provided. To take advantage of the multifile capabilities, you'll have to build the links as you create or modify fields—a far cry from *Professional File's* hand-holding. Fortunately, *PowerBase* supplies sensible default values as you design your data base.

Flexible multifile action is the reward for those who conquer *PowerBase's* steep learn-

EXECUTIVE SUMMARY**PFS: Professional File 1.01***Flat-file manager*

The epitome of user-friendliness, PFS: Professional File combines an attractive and logical interface with excellent list-handling capability. It easily produces several kinds of reports but cannot accommodate more than one custom form. Add great on-line help and smooth data exchange, and Professional File becomes a Best Buy.

User interface	●			
Data base setup	●			
Data entry and validation		●		
Querying and reporting		●		
File import/export	●			
Overall value	●			

EXCELLENT
GOOD
FAIR
POOR

ing curve. You can fill in data from outside fields and even edit a look-up field and send the changes back to the file of origin. Once established, the program's system of lookups and zoom functions allows you to move easily through multiple files. These links provide ammunition for bull's-eye reporting too, since data along a zoom path can be sorted, subtotaled, and printed in a highly flexible format.

PowerBase's report generator also supports ad hoc calculations for report fields, a valuable tool for data manipulation and analysis. The more links you assign, however, the slower the report generation. Searches or reports involving too many lookups may run out of memory.

Though generally well executed PowerBase is a bit of an orphan. It's a good way to learn relational concepts, and it provides some powerful, flexible data handling, but most people don't buy software to learn a concept—they buy to get the job done. If you

really need relational capability, you're probably better off buying one of the big guns in the first place.

Reflex: The Analyst 1.0

File managers don't have to be relational to be high-tech. Borland's *Reflex: The Analyst* offers statistical functions that easily beat dBASE's lineup, and its formula language is more powerful than 1-2-3's. Add built-in graphs and quick, powerful tools for viewing and outputting data, and you can see why *Reflex* has generated a loyal following among users who do trend analysis, asset planning, and the like.

Reflex costs a mere \$150, but hardware requirements can be steep. The specs say you need only 384K of RAM, but to massage data files larger than, say, 5000 records, you'll need LIM expanded memory. You'll also need a graphics adapter. Installation depends on the DOS COPY command.

Function keys and <Shift>-function key combos operate a 1-2-3-like menu bar. *Reflex*'s terminology is also reminiscent of a spreadsheet; you select cell ranges when retrieving a data base subset. A far cry from *Professional File* or *Q&A*'s pretty color-cod-

EXECUTIVE SUMMARY**PowerBase 2.3***Flat-file manager*

Excellent lookup features allow you to move easily between files for querying, reporting, and data validation. PowerBase's multifile powers, however, make it the most complex of the five to set up and use. This program is too complicated for most flat-file users, yet not powerful enough for real relational applications.

User interface			●	
Data base setup			●	
Data entry and validation	●			
Querying and reporting		●		
File import/export		●		
Overall value				●

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FEATURES EVALUATION

Versatile Flat-File Managers

For a blend of power and usability, try PFS: Professional File or RapidFile—they rival top-notch Q&A.

	PFS: Professional File 1.01	PowerBase 2.3	RapidFile 1.2	Reference File 1.0	Reflex 1.0	Q&A
Data entry, editing, and validation						
Variable-length fields	●	○	●	●	●	●
Currency fields	○	●	○	●	●	●
Calculated fields	●	●	●	○	●	●
Date fields	○	●	●	●	●	●
Time fields	○	○	○	○	○	●
User-customized screens	●	●	●	● ¹	●	●
Global record updates	●	●	●	○	●	●
Global record deletions	●	●	●	○	●	●
Validates via lookup table	○	●	○	○	○	●
Checks for valid data range	○	●	●	○	○	●
Checks for duplicate index keys	○	●	○	●	○	●
Requires entry on all fields	○	●	○	○	○	●
Number of data entry screens allowed	1	1	10 ²	1	2	10

Search and sort parameters						
Search on nonindexed field	●	●	●	●	●	●
Sort on nonindexed field	●	○	●	○	●	●
Search on multiple fields	●	●	●	●	●	●
Sort on multiple fields	●	○	●	●	●	●
Search/sort macros	●	○	●	○	○	●
Wild-card search allowed	●	●	●	●	●	●
Substring search allowed	●	●	●	●	●	●
Case-sensitive searches	○	○	○	●	○	○
Boolean searches	●	●	●	●	●	●
Compound Boolean	●	●	●	●	●	●

	PFS: Professional File 1.01	PowerBase 2.3	RapidFile 1.2	Reference File 1.0	Reflex 1.0	Q&A
Reporting capability						
Saves report formats	●	●	●	●	●	●
Send reports to screen	●	●	●	●	●	●
Send reports to disk	●	●	●	●	●	●
Date stamping	●	●	●	●	●	●
Mailing label formats provided	●	●	●	●	○	●
Headers allowed	●	●	●	●	●	●
Footers allowed	●	●	●	●	●	●
Forced page breaks	●	○	●	●	●	●
User-defined formats	●	●	●	●	●	●
Default formats provided	○	●	●	●	○	○

Capacity						
RAM requirements	256K	384K	256K	140K	384K	512K
Maximum file size (in records)	29,500	65,530	64,000	△	32,500	16 million
Maximum file size	4MB	△	10MB	64K	△	256MB
Maximum fields per record	3200	64	254	64	250	2182
Maximum record size	4MB	1.6K	7.5K	64K	16K	64K ³
Maximum text field size	1.95K	0.08K	64K	64K	0.254K	64K ³
Reads/writes DIF	○	●	○	● ⁴	● ⁴	●
Reads/writes ASCII	●	●	●	●	●	●

● Yes ○ No ● Deficient △ Unlimited

¹ With Reference File, you can change field names and window size, but you can't "paint" the screen or move fields from one side to the other.

² 250 lines total.

³ Q&A's word processing module allows text documents—basically one of up to 64K.

⁴ Reads but cannot write DIF files.

ed menus, *Reflex*'s graphics mode sometimes produces offbeat visual effects. When you pull down a menu, for instance, inactive items are blurred almost beyond recognition.

Reflex provides up to 45 screens per form and a fair number of editing and scrolling features. However, data validation is limited to date checking. Fields are variable length, and you can choose from the usual text, date, and numeric field types, as well as specify a repeating text field and an integer field. *Re-*

flex really shines at calculated fields. Applying its extensive formula language to a calculated field, for instance, you could, using a quantity conditional discount for a named range, return values based on the net cost of an order. You could then take that field and use it as a basis for projection formulas.

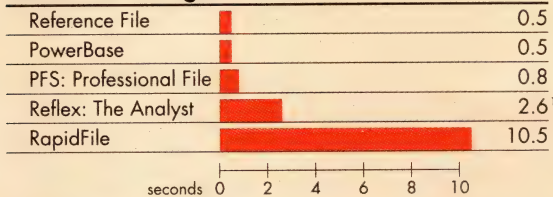
Reflex's unique strength is its ability to view relationships via graphs and formulas. You can look at data via the forms, list, graph, or cross-tab views or in formatted reports. Forms view displays one record at a time. The list view offers a simple row and

NSTL TEST REPORT

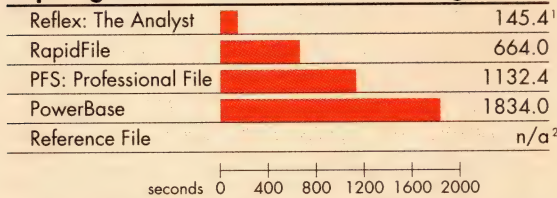
Flat-File Favorites

RapidFile lives up to its name in speed tests except for single-record searches. PFS: Professional File also delivers consistent performance.

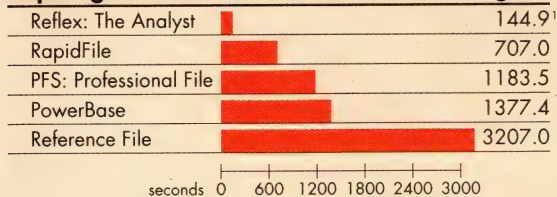
Search for a single record



Report generation with two-level sorting



Report generation with selection and sorting



¹ Reflex requires 2MB of memory to execute these tests, which gives it a performance advantage.

² A bug discovered in the Reference File quick-sort routine made it impossible to complete this test.

³ The test called for ten fields to be exported, but Reference File allows either eight selected fields or the entire file. This time is for the entire file.

The following versions were tested: *Reflex: The Analyst 1.0*, *RapidFile 1.2*, *Reference File 1.0*, *PFS: Professional File 1.01*, and *PowerBase 2.3*.

All benchmarks except for the *Reflex* tests were performed on an 8-MHz IBM PC AT with 640K and a 30MB hard disk. An AST expanded memory card with 2MB of RAM was required to run the tests for *Reflex*, which can use only data base files the same size as or smaller than the computer's available system memory. Testing was timed from the last keystroke of the command sequence until program control was returned to the user.

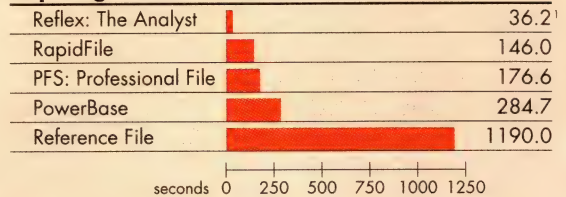
Search for a single record

This test measures the time required to search for a single record in a 5000-record inventory file, using the fastest type of search the program allowed.

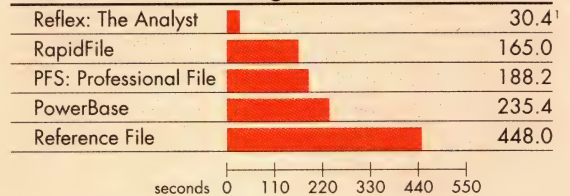
Report generation with two-level sorting

This test measures the time required to sort the inventory file using the price field as the primary key and the part number field as the secondary key, and to print the report consisting of 4 fields to a null printer (a device that simulates an infinitely fast printer, one not slowed by paper or printhead movement).

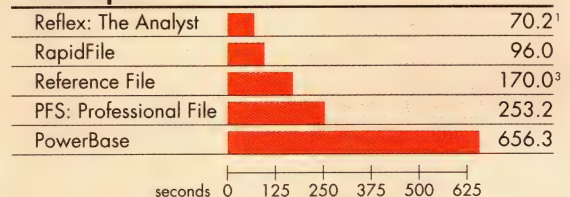
Report generation with selection



Print one-across mailing labels



ASCII export



Report generation with selection and sorting

This test measures the time required to sort the inventory file on the price field, select 818 records with price > 150, and print the report consisting of 10 fields to a null printer.

Report generation with selection

This test measures the time required to sort the inventory file on the price field, select 526 records with price > 5105.00 and part # > 104000, and print the report consisting of 10 fields to a null printer.

Print one-across mailing labels

This test measures the time required to print to a null printer mailing labels consisting of three fields. The fields were taken from 1000 records that were ordered by part number.

ASCII export

This test measures the time required to select 1000 records from a 5000-record data base and export them into a standard ASCII text file.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

column format. With the graph view you can display, edit, and plot scatter graphs and bar charts. Moreover, you can move the cursor to a point on a graph and have *Reflex* summon

the record that produced the highlighted value. You can even utilize a powerful For Each option that allows you to treat fields as multi-valued—sorting on different state names within the same field, for instance. The For

Each command extends to the cross-tab view, where you can also use any *Reflex* formula for quick exploration of "what if" scenarios. A split-screen feature allows you to display up to three views at once.

The fifth view, a formatted report, is powerful but inconvenient; you must exit *Reflex* and call up the separate report program to define a printout with headers, footers, and the like. This could be a fatal flaw if the program's viewing and quick report functions weren't already so powerful and flexible.

Unless you're an experienced user of data management or spreadsheet programs, *Reflex* will present a steep learning curve. The interface offers little comfort, and custom reports are a hassle. But if you're consistently data deep in statistical, periodic, financial, or other numerically dependent evaluations, *Reflex* can be a uniquely capable ally.

Reference File 1.0

And now for something completely different: a memory-resident file manager. *Reference File* waits behind your application, ready with unparalleled talents for searching heavily textual or technical data. One volume in a library of on-line reference products, *Reference File* is designed to cut and paste information to and from outside applications. At \$89, it's a bargain for that purpose. Limited forms creation and reporting, however, suggest that *Reference File* works better as a utility than as a full-featured file manager.

Reference File requires a hefty 512K of RAM. A longish install program prompts you to create directories, set up hot keys, and choose from screen attributes. If you use *Reference File* with several applications and need to change hot keys, you must redo that part of the installation.

Consistent commands, context-sensitive help, and pulldown menus make learning easy. However, screens are cluttered with overlapping messages that inhibit work space.

Reference File is perfect for searching large, unstructured, and technical data bases. You can search the whole data base

EXECUTIVE SUMMARY

Reflex: The Analyst 1.0

Flat-file manager

A great formula language and built-in graphics add up to a dynamite tool for analyzing financial, statistical, and other numeric data. But it's difficult to master, and formatted reports are a hassle to produce. *Reflex* requires LIM memory when handling files of significant size. At \$150, however, you'll get amazing software power.

User interface			●	
Data base setup		●		
Data entry and validation			●	
Querying and reporting		●		
File import/export	●			
Overall value		●		

EXCELLENT

GOOD

FAIR

POOR

for any word, phrase, number, or index key. Such specific string searches outperform anything *dBASE* can accomplish with its Locate command. And *Reference File*'s ability to construct nested conditional search parameters bests all the other file managers tested here.

Reference File also lets you search for both upper and lower ASCII characters. A handy pop-up ASCII table helps if you forget which symbols are tied to what key. And if you're working with scientific notation, you don't have to switch to a gnarly UNIX system running *LaTeX* to preserve the proper symbols.

Although *Reference File*'s search tools are great, the fundamentals suffer. For instance, to build a new data base, you must exit to DOS and load a separate program. The program supplies default data entry forms for a number of applications (customer tracking, contact lists, bibliographies), but customization is limited. You can resize and move fields and edit field names, but you can't paint the screen. Moreover, data validation is limited to checking for duplicate index keys.

Reference File's reporting is also inflexible, restricting you to choosing and moving the fields. Although the program supports

several types of numerical fields, summarizing numerical data in reports is limited to ranking them in ascending or descending order. You can't produce totals or subtotals, a basic requirement of most applications.

With its weak reporting and validation features, *Reference File* fails as a well-balanced file management package. But for collecting research, building a bibliography (it supports Dewey decimal fields), or organizing notes or lab work, it's a bargain.

RapidFile 1.2

Sporting a comprehensive feature set and swift performance, Ashton-Tate's *RapidFile* is well named. The latest version improves integration with *dBASE*, adds new user-definable fields and print options, and beefs up mail merge functions. In addition, the program now includes word processing powers comparable to *Q&A*'s (see "RapidFile: A Distant Relation," *PCW*, June 1987).

At \$295, *RapidFile* is the second most expensive product reviewed. It eats up 256K of RAM and needs at least two disk drives—or a hard disk if you use the new 80,000-word

spelling checker and thesaurus. Installation is smooth and menu driven.

RapidFile's generous interface lets you choose between a 1-2-3-style menu bar and pulldown menus. Basic tasks such as file building are easy. *RapidFile* automatically sizes fields during file creation, and the new version adds several field options, including user-defined currency formats. Except for lookups to other files, *RapidFile*'s data validation features are as complete as those in *PowerBase*, and its error messages are more precise.

Because it does not index, *RapidFile* is slow at searching for individual records. However, it lives up to its name in every other respect. It responds quickly to all Boolean criteria and does wild-card and string searches. Moreover, you can nest calculated expressions up to a limit of 254 characters each, thereby gaining impressive data-analysis tools that are easier to use than *Reflex*'s, though not as powerful. The program also provides three types of fully editable macros.

RapidFile provides a flexible array of word processing and mail merge features. You can do block moves and center and underline text, for instance. You can also perform mail merges with an imported file (as long as it's in ASCII format) and link form letters to a selection of records—though not as directly as with *Q&A*. Incorporating fields in a *RapidFile* form letter is as easy as picking them from a menu. In addition, you can insert a document of up to 64K in a single field.

RapidFile's reporting functions aren't as simple to use as *Professional File*'s, but they're more flexible and more powerful. The Quick Report option provides a columnar format of all or selected data in chosen fields. It can even use the formula language for easy "what if" evaluations of calculated data. Custom reports can be completely user designed, with up to 15 nested control breaks (or subtitled sections), and a handy new function removes unwanted blanks.

With a usable interface, powerful querying capabilities, and a full set of word processing features, *RapidFile* offers considerable power without drowning in its own features. Take into account its brisk performance, and

EXECUTIVE SUMMARY

Reference File 1.0

Flat-file manager

As a file manager, RAM-resident *Reference File* is compromised by a cluttered interface and weak reporting. As an \$89 tool for searching large, diverse, or technical data bases and minimally masaging the resultant data subsets, it's great.

User interface		●		
Data base setup			●	
Data entry and validation			●	
Querying and reporting		●		
File import/export		●		
Overall value		●		
	EXCELLENT	GOOD	FAIR	POOR

RapidFile is your best bet for advanced flat-file handling or mail merge-intensive applications.

Flat File Face-Off

For application needs that are evenly balanced between usability and capability, you have only two choices—*Professional File* and *RapidFile*. The former works well for absolute beginners, and the latter is excellent for more complex file management.

The other three packages can be recommended only for special needs. *PowerBase* scores well on data validation and zooms smoothly among numerous files. However, slow performance and demanding data-structure planning make it a file-management dinosaur. On the other hand, *Reflex* clearly owns a market niche with its ability to analyze data using statistical functions. Perhaps a rumored upgrade will improve its interface and reporting capability. And *Reference File* will no doubt find an enthusiastic audience among researchers who cull data from a variety of sources; but don't count on it for overall file-handling functionality.

As you can see, many capabilities and styles dwell under the rubric of menu-driven

EXECUTIVE SUMMARY

RapidFile 1.2

Flat-file manager

Not quite as easy to use as *PFS: Professional File*, *RapidFile*'s interface is still well done, with especially helpful error messages. It's skillful at querying and custom reporting, too. New word processing features make it the best single-product solution for mail merge applications.

User interface	●			
Data base setup	●			
Data entry and validation		●		
Querying and reporting	●			
File import/export		●		
Overall value	●			

EXCELLENT

GOOD

FAIR

POOR

flat-file managers. There's bound to be one you can live with productively. ●

Ellen J. Sander is a Los Angeles consultant specializing in data base and word processing applications. Marlene Nesary is an assistant editor for PC World.

WHERE TO BUY

PFS: Professional File 1.01

Software Publishing Corp.
P.O. Box 7210
1901 Landings Dr.
Mountain View, CA 94039-7210
408/848-4391, 415/962-0191 (technical support)
List price: \$249
Requirements: 256K, DOS 2.00 or later version
Not copy protected
Technical support: free to registered users, no toll-free number, M-F 8-5
Other support services: none

PowerBase 2.3

PowerBase Systems
32100 Telegraph Rd.
Birmingham, MI 48010
313/540-2398, 313/540-3706 (technical support)
List price: \$349
Requirements: 384K, two disk drives, DOS 2.00 or later version
Not copy protected
Technical support: unlimited free support to registered users, no toll-free number, M-F 9-6
Other support services: registered users may purchase additional business application templates for \$29.95; free 24-hour BBS for 1200-bps modems

RapidFile 1.2

Ashton-Tate
20101 Hamilton Ave.
Torrance, CA 90502-1319
800/437-4329 ext. 274, 303/799-4900 ext. 274
Colorado, 213/329-9989 (technical support)
List price: \$295
Requirements: 256K, two disk drives (one a hard disk drive if spelling checker is used), DOS 2.00 or later version
Not copy protected
Technical support: free for 90 days after registration, after 90 days \$50 per year per product for 10 calls, \$80 per year per product for 20 calls
Other support services: free support forums on CompuServe, The Source, and 24-hour Ashton-Tate BBS

Reference File 1.0

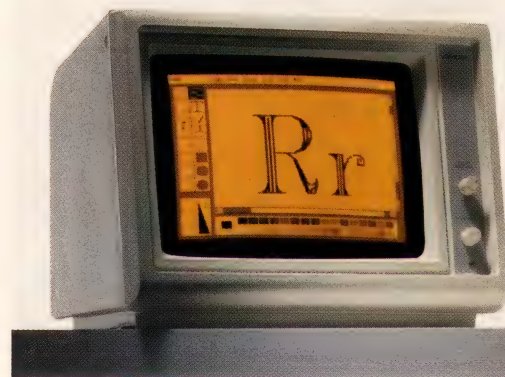
Reference Software
330 Townsend St. #131
San Francisco, CA 94017
415/541-0222
List price: \$89
Requirements: 512K, hard disk, DOS 2.00 or later version
Not copy protected
Technical support: no toll-free number, M-F 9-5
Other support services: none

Reflex: The Analyst 1.0

Borland Int'l
4585 Scotts Valley Dr.
Scotts Valley, CA 95066
408/438-8400, 408/438-8000 (technical support)
List price: \$149.95
Requirements: 384K, DOS 2.00 or later version, graphics card, LIM expanded memory for data files larger than system memory, mouse optional
Not copy protected
Technical support: no toll-free number, M-F 10-5
Other support services: Borland forum on CompuServe

For more information, see Products Featured in This Issue.

Viewers' Choice: 13 Monochrome Monitors



It's still hard to beat the razor-sharp text produced by that old workhorse, the monochrome monitor.

PC World reviews a baker's dozen of cheap monochrome displays and comes up with some clear favorites.

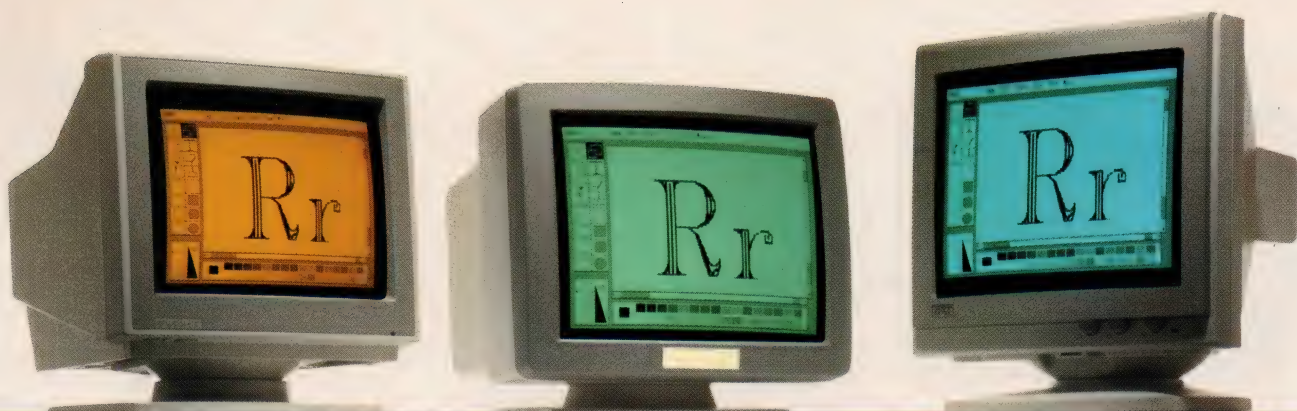
**TJ
Byers**

It may come as a surprise, but the PC's original monochrome monitor (and its compatibles) still offers the best resolution of any standard-mode display. To get text with as many dots per character in color, you'd have to have a PS/2 or VGA video adapter and buy a compatible color monitor—at \$300 to \$500 more. Moreover, analog monitors such as those for PS/2s can't match the digital crispness of a monochrome unit.

Sharp text is the reason a number of mossbacks (including at least one *PC World* editor) still prefer monochrome monitors for word processing. Now that low-cost, standard paper-white displays are available along

with conventional green and amber units, the monochrome option is even more attractive. Drive one of these babies with a Hercules Graphics Card (HGC), which provides a graphics resolution of 720 by 348 pixels, and you've got a low-end desktop publishing solution. (*Ventura Publisher*, *PageMaker*, and *Microsoft Windows* all have drivers for the HGC.)

Few people actually shop for a monochrome monitor; they just get one along with a PC. Next to no display at all, a PC's least expensive configuration includes a monochrome unit, so you simply take whatever the manufacturer stocks. They're all the same anyway, right? Wrong. In fact, monochrome monitors vary in quality from manufacturer to manufacturer more than color displays do.



Take bandwidth, for example. Some monochrome monitors have a bandwidth rating lower than the 20-MHz industry standard and are consequently less sharp than the original PC's monochrome display. On the other hand, those with bandwidths *higher* than 20 MHz can be driven by high-resolution monochrome boards with no fall-off in image sharpness. For example, boards such as STB's Chauffeur HT or Everex's The Edge—both of which have higher resolutions than the HGC or the Monochrome Display Adapter (the monochrome board that came with the original PC)—work best driving a monitor with at least a 25-MHz bandwidth.

Another important variation is in the shape of the screen. The flatter the screen, the less glare caused by reflected ambient light. Flat screens also minimize geometric distortion; curved screens (such as the one found on IBM's original monochrome monitor) bend straight lines, especially at the image's edge.

To help you decide whether you should accept a PC vendor's off-the-shelf monitor—or to guide you in replacing one that doesn't make the grade—*PC World* has rounded up 13 amber and paper-white displays, each of which sells for less than \$200. Whenever a manufacturer offers green, amber, and white versions of the same monitor, we've reviewed soothing paper white. And given the choice of green or amber, we've gone with amber, because we think it's a bit easier on the eyes.

Amdek 210

PROS: None

CONS: Curved screen, no tilt-and-swivel base, high price

Looking every bit like the PC's original monochrome display, the Amdek 210 is one of the least desirable monitors in this roundup. The display leans back at an angle and reflects every bit of light in the room; there's no tilt-and swivel base, so propping up the monitor is the only way to correct this problem. The curved screen's antiglare treatment helps somewhat, but it also reduces image quality. Priced at a whopping \$199 and carrying only a six-month warranty, the Amdek 210 has to be the worst deal of the century.

AST Premium Display/Monochrome

PROS: White phosphor, flat screen

CONS: Slight flicker

A paper-white monitor with an almost-flat surface, the Premium Display boasts a 14-inch screen, a size matched in this roundup only by the CTX 2400 and the Xtron MF147. However, the relatively large screen produces noticeable spaces between the scan lines. In addition, the kind of white phosphor used causes a slight flicker when you scroll text. The Premium Display is one of the most expensive monitors reviewed, but \$195

From left to right:
the Amdek 210; the
Casper GM-1266; and
the best paper-white
monitors in the
roundup, the CTX
2400 and the AST
Premium Display/
Monochrome



The imTEC 1252 (left), the Magnavox Professional PC Monitor 80 (middle), and the Datafox SM-12SFA7

isn't bad for a paper-white unit, especially one with a nearly flat screen. Unfortunately for AST, the CTX 2400 beats the Premium Display's price and performance hands down.

Casper GM-1266

PROS: Low price, tilt-and swivel base

CONS: Curved screen

The GM-1266 12-inch monitor is a great buy at only \$99, but it can't beat the value of the comparably priced Samsung MD-1278. The problem is that the Casper GM-1266 has a curved screen surface, which produces glare and geometric distortion. Otherwise, the screen quality is good, the tilt-and-swivel base helps defeat the glare, and the controls are conveniently located. All in all, the Casper has to be rated the third-best deal in this roundup.

CTX 2400



PROS: Dual frequency, high bandwidth, white phosphor, inverse-video switch, flat screen, low price

CONS: None

AST may have the high profile, but the CTX 2400 is the low-cost paper-white monitor of choice. At \$168, the price is \$27 less than the Premium Display's, and the type of

white phosphor used produces no noticeable flicker when you scroll text. Even better, this monitor offers a high-performance 25-MHz bandwidth—enough to handle the high resolution of the STB Chauffeur or Everex's The Edge. Now the clincher: The CTX 2400 is the only dual-frequency monitor in the roundup, and thus the only one capable of working with a CGA card. Top it off with a two-year warranty and an inverse-video toggle for black-on-white viewing, and you know why we selected this monitor as a Best Buy.

Datafox SM-12SFA7

PROS: Flat screen, tilt-and-swivel base

CONS: Relatively high price

The Datafox SM-12SFA7 amber monitor is identical to the Samsung MD-1278—and for good reason: Samsung makes the monitor for Datafox. The only discernible difference is the name on the logo; the warranty card even bears Samsung's name and mailing address. Although this is a great monitor, it does have one flaw: Samsung sells the same display for one-fourth less! Save your cash and go straight to the horse's mouth on this one.



imTEC 1252

PROS: Tilt-and-swivel base

CONS: Curved screen, short power cord

The imTEC 1252 comes from Leading Technology, one of the better-known PC clone suppliers. There's not a lot to be said about this plain-vanilla monitor—it comes with a tilt-and-swivel stand, but its screen is as curved as IBM's old standby. Another problem is the short power cord, though that won't bother you unless your system unit lives under the desk. You'd be safe accepting this monitor with a Leading Edge PC, but three monitors in this roundup beat the imTEC 1252's \$139 retail price.

Magnavox Professional PC Monitor 80

PROS: Two-year warranty

CONS: Curved screen, no tilt-and-swivel base, plug-in video cable

You may find that the Professional PC Monitor 80 has a bit of a glare problem, due to its curved screen and lack of a tilt-and-swivel base. A lesser annoyance is a video cable that isn't hardwired into the monitor. You must plug the supplied cable into a connector on the monitor and into the video board, dou-

bling the chances of a loose connection. In addition, although the second unit we received worked fine, the first Professional PC Monitor 80 was defective: The display jittered nervously, one line up and one line down. Unless you find this \$189 monitor at a fabulous street price (Magnavox is typically heavily discounted), pass on it.

Packard Bell PB 1272

PROS: Side-mounted controls, tilt-and-swivel base

CONS: Curved screen

The PB 1272's screen image is good and crisp, and the tilt-and-swivel base can compensate for the curved screen. The brightness and on/off controls are side-mounted and recessed, lending the monitor a trimmer look than most. The former list price was \$189, but at press time Packard Bell was revising the price structure of its product line, so no list price was available. A Packard Bell spokesperson told us the street price is about \$70—a claim we were able to verify. The prize-winning Samsung MD-1278 retails for \$25 more, and its street price may well be less; even if it isn't, the Samsung's flat screen is worth the extra bucks.

The Packard Bell PB 1272 (left), the winning Samsung MD-1278 (middle), and the Quimax DM-12



The paper-white Xtron MF147 (left), the Thomson 230 (middle), and the Tatung MM-1255

Quimax DM-12

PROS: Tilt-and-swivel base

CONS: Few externally accessible controls, curved screen, moderately high price

Quimax monitors are very popular with system distributors because they're so simple. In fact, only top-of-the-line Quimax models have an on/off switch (the DM-12 doesn't), and none venture beyond the DM-12's user-accessible brightness and contrast controls. As a result, there's virtually nothing you can do to screw up one of these monitors short of a using a chain saw on it. Of course, that assumes the factory has adjusted the monitor correctly.

Samsung MD-1278



PROS: Low price, flat screen, tilt-and-swivel base

CONS: Rear-mounted controls

Of all the monitors reviewed, the Samsung MD-1278 (or SM-12SFA7, depending on which manual you receive) gives you the most bang for the buck (the paper-white version was not available in time for review). At \$97 list, it has the lowest retail price tag of any monitor in this roundup—a potent criterion in its Best Buy ranking. When you con-

sider that the screen is almost perfectly flat, how can you go wrong? The MD-1278's only bad point is that the brightness and contrast controls are in the rear and require a go-rilla stretch to reach. But what the heck—considering the number of times you access these items (once set, usually forgotten), the MD-1278 is just too good a buy to pass up.

Tatung MM-1255

PROS: Bandwidth slightly higher than average, tilt-and-swivel base

CONS: Curved screen, moderately high price

The Tatung MM-1255 falls into the same class as the Casper GM-1266, the imTEC 1252, the Packard Bell PB 1272, and the Quimax DM-12: curved screen, tilt-and-swivel base. As with the Packard Bell unit, the contrast and brightness controls are side mounted, out of the way but accessible. The MM-1255's standout feature is a bandwidth of 22 MHz, which should give the unit slightly better sharpness than standard 20-MHz monitors when used with high-resolution boards. Quimax, Samsung, and Tatung provide the monitors most popular with Taiwanese clone makers, so the MM-1255 is like-

FEATURES EVALUATION

Monochrome Monitors

Less than \$200 will get you a perfectly acceptable monochrome display. In this roundup, the CTX 2400 and the Samsung MD-1278 are the best values.

	Amdtek 210	AST Premium Display/Monochrome	Casper Glt-1266	CTX 2400	Datatax SM-125FA7	imTEC 1252	Magnum PC Monitor 80	Packard Professional	Quimex DM-12	Samsung MD-1278	Tatung MM-1255	Thomson 230	Xtron MF147
Standard features													
Diagonal measurement (inches)	12	14	12	14	12	12	12	12	12	12	12	12	14
Bandwidth (MHz)	20	20	20	25	20	20	20	20	20	20	20	22	25
Flat screen	○	●	○	●	●	○	○	○	○	○	○	○	●
Tilt-and-swivel base	○	●	●	●	●	●	●	○	●	●	●	●	○
Screen colors available													
White	○	●	○	●	○	○	○	○	○	○	○	○	○
Amber	●	○	●	●	●	●	●	●	●	●	●	●	●
Green	●	○	●	●	●	●	●	●	●	●	●	●	●
Externally accessible controls ¹													
Horizontal hold	○ ²	○	○	○	○	●	● ²	●	○	○	○	○	○
Vertical hold	●	○	●	○	●	●	●	●	○	○	○	○	○
Vertical size	●	○	●	●	●	●	●	●	○	○	○	○	○
Focus	○	●	○	○	○	○	○	○	○	○	○	○	○

¹ All monitors reviewed have externally accessible contrast and brightness controls.

² Horizontal size control is externally accessible.

ly to turn up with many a plain-vanilla box. Off the shelf, however, \$165 is a bit much to pay for a monitor of only adequate quality.

Thomson 230

PROS: High bandwidth

CONS: Curved screen, no tilt-and-swivel base, minor sync problem

Were it not for the CTX 2400, the Thomson 230 would be the monitor of choice for handling high-resolution boards like the STB Chauffeur or the Everex Edge. The Thomson 230 isn't available in paper white, however, and it has no tilt-and-swivel base to make up for the curved screen. And every once in a while it locks on to a sync signal that squashes the image to half its normal height;

a simple vertical hold adjustment always cures the problem. If you plan to push your resolution, this \$159 high-octane monitor is viable only as a second choice.

Xtron MF147

PROS: Flat screen, white phosphor, tilt-and-swivel base

CONS: Low bandwidth, poor focus

The Xtron MF147 14-inch paper-white display is made by the same Korean manufacturer that produces the AST Premium Display/Monochrome. While the two are vir-

tually indistinguishable on the outside, the electronics inside are quite different. Whereas the AST offers a full 20-MHz bandwidth, the Xtron MF147 is limited to 17 MHz, which results in a noticeable drop-off in focus from the screen's center to its corners. Xtron has made this trade in performance in exchange for lower manufacturing costs, yet it lists the MF147 at a steep \$199.95. In short, stay away from this one.

Pick Your Partner

If you're in the market for a cut-rate clone, don't just look at the ad. Call the vendor and ask what display the company is shipping that week with the machine you want. If it's an Amdek 210, a Magnavox Professional PC Monitor 80, or especially an Xtron MF147, you'd be better served buying a monitorless

configuration and doing a little shopping.

The conclusion of this roundup is a happy one: Price is not a measure of quality. The two best buys in this roundup, the Samsung MD-1278 and the CTX 2400, happen to be the least expensive in their classes. We've provided only list prices, however, so you'll probably find many of the monitors in this roundup selling for less—in some cases, a lot less, particularly the plain-vanilla, convex-CRT displays. A little price comparison can net you a very good deal. ●

TJ Byers is a contributing editor for PC World.

WHERE TO BUY

Amdek 210

Amdek Corp.
1901 Zanker Rd.
San Jose, CA 95112
408/436-8570

List price: \$199

Warranty: six months parts and labor

AST Premium Display/Monochrome

AST Research
2121 Alton Ave.
Irvine, CA 92714
714/863-1333

List price: \$195

Warranty: one year parts and labor

Casper GM-1266

TW Casper Corp.
2153 O'Toole Ave.,
Ste. E
San Jose, CA 95131
408/922-0188

List price: \$99

Warranty: one year parts and labor

CTX 2400

CTX Int'l
260 Paseo Tesoro
Walnut, CA 91789
714/595-6146

List price: white \$168, amber or green \$159

Warranty: two years parts and labor

Datafox SM-12SFA7

Datafox, Inc.
205 S. 29th St.
Phoenix, AZ 85034
800/821-6317

List price: \$129

Warranty: one year parts and labor (excluding labor for CRT)

imTEC 1252

Leading Technology
10430 S.W. Fifth Ave.
Beaverton, OR 97005
503/646-3424

List price: \$139

Warranty: one year parts and labor

Magnavox Professional PC Monitor 80

N.A.P. Consumer Electronics Corp.
P.O. Box 6950
Knoxville, TN 37914
615/521-4366

List price: amber \$199, green \$189

Warranty: two years parts and labor

Packard Bell PB 1272

Packard Bell Electronics
6045 Variel Ave.
Woodland Hills, CA 91367
818/704-3905

List price: not available

Warranty: one year parts and labor

Quimax DM-12

Quimax Systems
844 Del Rey Ave.
Sunnyvale, CA 94086
408/773-8282

List price: \$159

Warranty: one year parts and labor

Samsung MD-1278

Samsung Electron Devices
16031 S. Carmenita Rd.
Cerritos, CA 90701
213/404-1835

List price: white and amber \$97, green \$95

Warranty: one year parts and labor

Tatung MM-1255

Tatung Co. of America, Inc.
2850 El Presidio St.
Long Beach, CA 90801
213/637-2105

List price: amber \$165, green \$159

Warranty: one year parts and labor

Thomson 230

Thomson Consumer Products Corp.
5731 W. Slauson Ave.
#111
Culver City, CA 90230
213/568-1002

List price: \$159

Warranty: one year parts and labor (excluding labor for CRT)

Xtron MF147

Xtron Computer Equipment Corp.
19 Rector St., 35th floor
New York, NY 10006
800/854-4450

List price: white \$199.95, amber or green \$189.95

Warranty: one year parts and labor

For more information, see Products Featured in This Issue.

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THE NEW 20MHz 386 SYSTEM 310.

The top of the line. It's the highest performance 80386 computer available, faster than the IBM[®] PS/2[†] Model 80 and the Compaq[†] 386/20. It runs at 20 MHz, with the latest 32-bit architecture for maximum performance. And it's completely MS[®] OS/2 compatible. Since it also has Intel's[†] Advanced 82385 Cache Memory Controller, and high performance disk drives, the System 310 is ideal for intensive database management, complex research and development, CAD/CAM, and desktop publishing. As a network file server the system offers an unbeatable combination of price and performance.

Standard Features:

Intel[†] 80386 microprocessor running at 20 MHz.
1 MB of 80 ns 32-bit RAM expandable to 16 MB without using an expansion slot.
Advanced Intel 82385 Cache Memory Controller with 32 KB of high speed static RAM.
Socket for 20 MHz 80387 coprocessor.
5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.
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Options:

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2 MB or 8 MB memory expansion boards.

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40 MB-28 ms	\$4,099	\$4,299	\$4,399
90 MB-18 ms ESDI	\$4,899	\$5,099	\$5,199
150 MB-18 ms ESDI	\$5,399	\$5,599	\$5,699
322 MB-18 ms ESDI	\$7,399	\$7,599	\$7,699



THE NEW 20MHz 286 SYSTEM 220.

As fast as most 386 computers, at less than half the price—more power for the money than any other system. An 80286 system that runs at 20 MHz, with less than one wait state. Completely compatible for both MS-DOS and MS OS/2 applications (it runs OS/2 faster than IBM PS/2 Model 80), and with a remarkably small footprint, the System 220 is the ideal executive workstation for database management, business, or sophisticated connectivity applications. The system uses page-mode interleaved memory; the page-mode RAM operates at less than one wait state, and inter-leaving results in a performance increase of about 15 percent.

Standard Features:

80286 microprocessor running at 20 MHz.
1 MB of RAM expandable to 16 MB (8 MB on system board).
Integrated diskette and VGA video controller on system board.
One 3.5" 1.44 MB diskette drive.
Integrated high performance hard disk interface on system board.
Enhanced 101-key keyboard.
1 parallel and 2 serial ports.
LIM 4.0 support for memory over 1 MB.
Real-time clock.
Three full-sized AT[†] compatible expansion slots.
Socket for 80287 coprocessor.
Dell System Analyzer.
MS-DOS and MS OS/2 compatible.
Security lock with locking chassis.
12 month on-site service contract (Available on complete systems).
Options:
3.5" 1.44 MB diskette drive.
Intel 80287 coprocessor.
1 MB RAM upgrade kits.

SYSTEM 220	With Monitor		
	VGA Mono	VGA Color	VGA Color Plus
One Diskette Drive	\$2,299	\$2,499	\$2,599
40 MB-29 ms Hard Disk	\$2,999	\$3,199	\$3,299
100 MB-29 ms Hard Disk	\$3,799	\$3,999	\$4,099



THE NEW 12.5MHz 286 SYSTEM 200.

A great value in a full-featured AT compatible. An 80286 computer running at 12.5 MHz, this system is completely MS OS/2 compatible. It's ideal for general business applications, as well as software development, local area networks, CAD/CAM, and desktop publishing. The System 200 offers high speed drive options, industry standard compatible BIOS, and on-site service. At these low prices, the System 200 is the best value in the 80286 marketplace. As Executive Computing said of this computer's predecessor, "If faster processing speed and low cost are two key issues affecting your purchase decision, this machine might be the ideal choice for your office."

Standard Features:

Intel 80286 microprocessor running at 12.5 MHz.
640 KB of RAM, expandable to 16 MB (4.6 MB on system board.)
5.25" 1.2 MB or 3.5" 1.44 MB diskette drive.
Dual diskette and hard disk drive controller.
Enhanced 101-key keyboard.
1 parallel and 2 serial ports.
200-watt power supply.
Real-time clock.
6 expansion slots. (4 available with hard disk drive controller and video adapter installed).
Socket for 8 MHz 80287 coprocessor.
Dell System Analyzer.
MS-DOS & MS OS/2 compatible.
Security lock with locking chassis.
12-month on-site service contract (Available on complete systems).

Options:

512 KB RAM upgrade kit.
8 MHz Intel 80287 coprocessor.

SYSTEM 200	With Monitor and Adapter			
	Hard Disk Drives	Mono	VGA Mono	VGA Color Plus
	20 MB	\$2,099	\$2,299	\$2,499
40 MB-40 ms		\$2,299	\$2,499	\$2,699
40 MB-28 ms		\$2,499	\$2,699	\$2,899
90 MB-18 ms ESDI		\$3,299	\$3,499	\$3,699
150 MB 18 ms ESDI		\$3,799	\$3,999	\$4,199
322 MB 18 ms ESDI		\$5,799	\$5,999	\$6,199



THE NEW 8088 SYSTEM 100.

A full-featured, yet economical one-piece computer for office, school, or home. This system is fast, easy to use, and ready to run with Dell Enhanced MS-DOS 3.3, Microsoft® DOS Manager, and Microsoft Works software—more than a \$400 value, included at no extra charge. Complete MS-DOS compatibility means you can run thousands of programs for business, personal finance, education, and entertainment. And the System 100 can grow, with the high quality options listed below. A price leader in 8088 technology, the System 100 boasts an innovative design that allows for more power, speed and convenience than most of its competitors.

Standard Features:

Intel 8088 microprocessor running at 9.54 MHz selectable to 4.77.
640 KB of RAM.
3.5" 720 KB diskette drive.
Diskette drive controller integrated on system board.
Integrated high-quality 84-key keyboard.
1 serial and 1 parallel port.
Two full-sized expansion slots available when video adapter is installed.
One half-sized expansion slot used for video adapter.
Socket for 8 MHz 8087 coprocessor.
Internal speaker with earphone jack and volume control.
Security Tie-Down bracket.
Dell Enhanced MS-DOS 3.3
Microsoft DOS Manager,
Microsoft Works.

Options:

3.5" 720 KB diskette drive.
8 MHz Intel 8087.

SYSTEM 100	With Monitor and Adapter			
	Mono	CGA Color	VGA Mono	VGA Color
720 KB Diskette Drive	\$1,099	\$1,199	\$1,299	\$1,499
Two 720 KB Diskette Drives	\$1,249	\$1,349	\$1,449	\$1,649
20 MB Hard Disk	\$1,599	\$1,699	\$1,799	\$1,999



PRINTERS. We now offer a full line of PC-compatible dot matrix and laser printers. Our dot matrix printers range from inexpensive near-letter quality printers to the highest resolution printers available. Our laser printers include some of the fastest, most reliable printers ever made. All are 300 dots per inch, and all support serial and parallel interfaces. And all printers come with our 30-day money-back guarantee and a one year warranty.

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Dual 250-sheet input trays

Laser System 80 \$3,195
8 pages per minute text and graphics
1.5 MB standard memory, expandable to 2.0 MB

Laser System 60 \$2,195
6 pages per minute, text and graphics
1.5 MB standard memory, expandable to 2.0 MB

DOT MATRIX PRINTERS

Printer System 800 \$699.95
Highest resolution text and graphics from a 24-wire dot matrix printer
Draft quality at 200 cps

Correspondence quality at 132 cps
Letter quality at 66 cps
Standard parallel and serial interfaces
Wide carriage

Printer System 600 \$499.95
9-wire dot matrix
Draft quality at 240 cps
Near-letter quality at 60 cps
Standard parallel interface
12.6 KB Buffer (expandable to 28.6 KB)
Wide carriage

Printer System 300 \$199.95
9-wire dot matrix
Draft quality at 144 cps
Near-letter quality at 36 cps
Four standard fonts
Paper parking
4 KB buffer
Standard Parallel interface

PERIPHERALS. With our unique manufacturing capabilities, we can build a system to your exact specifications. We offer monitors, modems, graphics boards, tape backups, hard drives, diskette drives, expanded memory boards, a serial mouse, and more. Call for details.

Operating System Software

Dell Enhanced MS-DOS 3.3 with disk cache and other utilities \$119.95.

Dell MS OS/2 Standard Edition 1.0 \$324.95

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AD CODE NO. 11DH8

Circle 74 on reader service card

THE HARDWARE SHELF

134 **AST Premium/386, IBM PS/2 Model 80-111**

Power users: Do you want immediate gratification, or a platform for the future? Two 20-MHz 386 systems give you a choice.

142 **Tandon PAC 286 Plus**

Popping hard disks in and out of this AT clone at the touch of a button may be convenient, but is it more than a gimmick?

150 **Epson LQ-1050**

An inspired combination of speed, print quality, paper handling, and price—possibly the perfect 24-pin dot matrix printer.

156 **Micronics 1616-01, 2016-01, 2020-01**

A trio of motherboards for upgrading ATs. If your time is expensive, they may be worth their considerable price.

AST Premium/386

20-MHz 80386 computer

PROS: Fast performance, multimaster capability, accommodates AT boards, ESDI controller

CONS: Expensive RAM modules

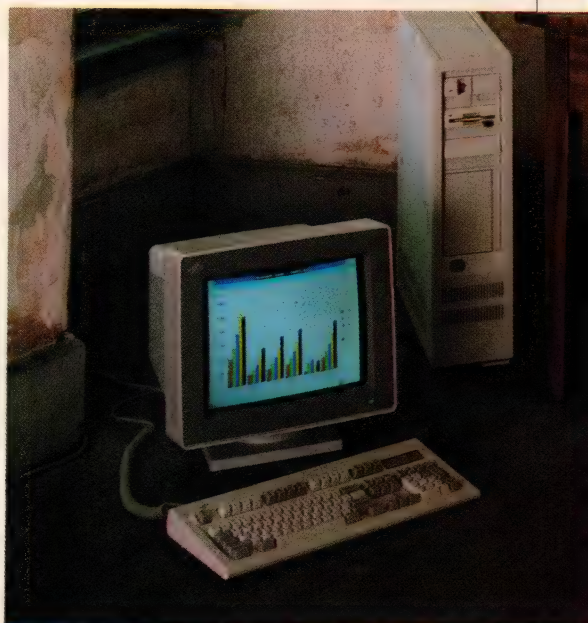
IBM PS/2 Model 80-111

20-MHz 80386 computer

PROS: Fast performance, multimaster capability, ESDI controller

CONS: Pricy, won't accommodate AT boards, no 5¼-inch floppy option

Now that 20 MHz is the going clock rate for 80386 machines, users desperate for high-performance network servers, CAD workstations, or nonstop multitasking are puzzling over which speedster to buy. Should they get a low-end 20-MHz system, or a high-class, pricey machine like the new 20-MHz PS/2 Model 80-111 (officially termed the 8580-111), with its tantalizing—but AT-incompatible—Micro Channel features? Now, AST Research has raised yet another option with the Premium/386—one that seems to offer the best



of both worlds: 20-MHz 80386 speed, name-brand reliability, low price (at least compared to an IBM), plus Micro Channel-like Smartslot architecture that maintains complete compatibility with AT boards.

The key similarity between AST's Smartslot bus and IBM's Micro Channel is the ability to accommodate multiple *bus masters*, microprocessor-equipped expansion boards that can perform functions independent of the CPU (see "A Model for the '80s," *PCW*, December 1987).

This *multimastering* capability is the hardware side of multitasking. Rather than having a multitasking operating system like OS/2 slice up CPU time and slow things down, the Model 80 and the Premium/386 will (once the boards and software arrive) be able to dedicate a microprocessor to each application. Thus, you might have one bus master running a micro-to-mainframe application, another sending ultra-high-resolution graphics to the screen, and another accelerating disk I/O, yielding a powerhouse architecture that would make even the fastest single-80386 system look sick.

And guess what? AST delivers multimaster functionality for less. Configure both units with 2MB of RAM, one floppy drive, a VGA adapter, one parallel and one serial port (AST throws in an extra serial port), a 101-key keyboard, and an ESDI hard disk/controller combo, and the AST weighs in at \$9535, while the 20-MHz IBM tips the scales at \$10,995. (You'll have to add the price of a monitor to each system.) This is not a perfect comparison, because the standard configuration for the 20-MHz Model 80 includes a 115MB hard disk instead of the Premium/386's 90MB unit, but few would argue that an extra 25MB of mass storage is worth \$1500.

Nonetheless, other price/performance comparisons are worth making. First of all, the Premium/386 is slightly faster. More important than the machines' relative speeds,

though, is how they will perform with bus masters. After all, that's the added value you're paying for; otherwise you might as well get a cheap, generic 20-MHz box and save yourself a few thousand bucks.

Although it's tough to imagine such a scenario, all eight slots on the Model 80's I/O bus (three 32-bit and five 16-bit) can handle bus masters. By contrast, only three of the Premium/386's slots are Smartslots (which, although slightly longer than standard 8/16-bit slots, accommodate 16-bit AT boards). Furthermore, all things being equal, a bus master in one of the Model 80's 32-bit slots would presumably have twice the throughput of one located in a Premium/386 8/16-bit Smartslot. But all things aren't equal. The Premium/386's I/O bus runs at 8 MHz, while the Model 80's runs at 10 MHz, giving IBM's entry another 20 percent edge.

Another important difference between the two architectures is the way they arbitrate requests from intelligent devices on the bus. With multiple processors moving data around without the CPU paying any mind, the possibilities for conflict are obvious. Traffic management needs to be built into the bus—hence the name for AST's Smartslot. However, the Micro Channel (or its

The IBM PS/2 Model 80-111 (left) and the AST Premium/386 (below) share a 20-MHz clock speed and multimaster capability—but the Model 80 is a smarter buy.



FEATURES EVALUATION

20-MHz 80386 Computer Systems

AST's Premium/386 costs about \$1500 less than IBM's PS/2 Model 80-111, but Big Blue's machine offers more memory, greater memory capacity, and the potentially more powerful Micro Channel.

●
Yes
○
No

Standard features

	AST Premium/386	IBM PS/2 Model 80-111
Price ¹	\$9535	\$10,995
CPU	80386	80386
Clock speed	20 MHz	20 MHz
Built into motherboard		
Parallel port	●	●
Serial port	● ²	●
Floppy disk controller	○	●
Video adapter	○	●
Coprocessor support	80387	80387

32-bit memory capacity

Amount shipped with basic unit	1MB	2MB
Maximum installable	13MB	22MB

Expandability

8/16-bit expansion slots/number free	4 ³ /3	5 ⁴ /4
8-bit expansion slots/number free	2/1	0/0
Half-/full-height storage device bays	5/0	2 ⁵ /2
120MB or larger hard disk available from manufacturer	●	●

Ergonomic design

Front-panel reset button	●	○
Front-panel on/off switch	○	●
Front-panel keyboard socket	○	○
ROM-based setup software	○	○
Tilt-and-swivel monitor	●	●
Compact footprint	●	● ⁶
Complete documentation	●	●

¹ Price based on 2MB RAM, one floppy drive, one 115MB (IBM) or one 90MB ESDI (AST) hard disk and controller, VGA (monitor not included), one parallel port, one serial port, and a 101-key keyboard.

² Includes two RS-232C 25-pin serial ports.

³ All slots accept AT-compatible boards. Three of the four are Smartslots.

⁴ All slots accept MCA-compatible boards. The I/O bus also has three 32-bit slots.

⁵ Half-height bays accept only 3½-inch devices.

⁶ Floor-standing model.

manufacturer, perhaps) is even smarter.

IBM's specifications require manufacturers to assign an arbitration level to every Micro Channel board, whether it's a bus master or not—giving each device a priority in the queue for memory and other system resources. Smartslot boards have similar specifications, but since part of the whole Smart-slot idea is backward-compatibility with dumb AT boards, these older devices will be cut out of the arbitration scheme.

Of course, all the fuss over bus masters is still somewhat theoretical, since as yet no bus master boards are for sale. On the other hand, one step ahead of IBM, AST has recently announced its first intelligent board, the Advanced Disk Controller (ADC), which should be available this fall. AST's Smart-slot controller will use its own 10-MHz 80186 microprocessor and a 64K track buffer to achieve a transfer rate of up to 15 megabits per second—one third faster than standard ESDI controllers. An optional enhancement for the ADC will provide 512K (expandable to 4MB) of read-ahead caching.

Future devices aside, a more immediate consideration is memory expansion. At first glance, the Premium/386's future looks bright. Not only can it hold up to 13MB of 32-bit RAM (on a board that fits in a special 32-bit memory slot), but all that memory can be accessed at a full 20 MHz; a static-column RAM scheme alternates wait states between zero and one. The Model 80 uses a paging scheme to keep its memory access speed hovering in the same zone, but the maximum amount of 32-bit RAM it can access at 20 MHz is only 4MB. With one of IBM's 6MB memory expansion boards plugged into each of the I/O bus's 32-bit expansion slots, the 32-bit RAM total can rise to a generous 22MB, but 18MB of that will be accessed at half speed.

The problem for AST is the price of its RAM. Adding 4MB of 32-bit RAM to the Model 80 will cost you \$2890; adding the same amount to the Premium/386 Model 390 runs a staggering \$7995—more than the base price of the machine! Clearly, AST is suffering from today's inflated open-market RAM prices, while IBM enjoys the ability to manufacture its own chips.

Ten plugs for letting everyone use the laser printer, the dot matrix, the daisywheel, the plotter or the modem anytime they want. Automatically! For 1/4 the cost of a new laser.

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1 Laser printers are expensive, but everybody wants one. Answer: let them all share the same laser. The same goes for other peripherals. The Buffalo® SX™ does it all, and costs far less than the extra printer you won't have to buy!

Saves time like a LAN

2 Day in, day out, the Buffalo SX turns wasted hours into productive hours. No more plugging and unplugging cables, swapping disks, throwing switches. No waiting. People just choose the peripheral they need and get on with the next job. Input and output are handled simultaneously, "on demand" at all ports.

The most practical connection you can buy

3 Buffalo boxes do more than other sharing devices that cost 40% more per port. Just look at this comparison:

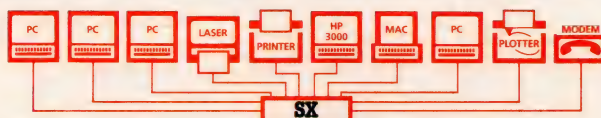
	BUFFALO SX	BOX X
Price:	\$525	\$595
Total Ports:	10	8
Cost/Port:	\$52.50	\$74.38
Max. Output Ports:	8	6
Max. Input Ports:	7	6
Max. Serial Ports:	5 (4 In or Out)	4 (In or Out)
Max. Parallel Ports:	5 (3 In or Out)	4 (2 In, 2 Out)
Max. Buffer:	1 Mb	512K
Software Upgrades:	FREE user installable	\$50 factory installed
Unltd. Toll-Free Support?	Yes	No
Money-Back Guarantee?	45 days	No

Print by menu

4 Just select the printer from a pop-up menu, using printer names you've chosen. Move the cursor to the one you want and hit Enter. Nothing could be simpler. RAM-resident software takes just 11K and works with text and VGA graphics displays like Ventura Publisher.®

Hook almost anything to anything

5 PCs, Macs, minis and mainframes can share printers and exchange data with communications software.



A 1,200 GPS printer?

6 That's what a computer thinks it's hooked to when it downloads data into the big buffer. Print jobs are

stored in order, and computers are freed up. People can go on to another job as the box spoon-feeds

data to the printers. Capacities range from 256K to 1 Mb—plenty for desktop publishing and big CAD drawings.

Instant installation

7 Just plug in the cables and run the menu-driven installation software. The SX has ten ports—5 serial and 5 parallel. Conversion is automatic. Connect 7 computers to 3 peripherals. Or 2 computers to 8 peripherals. Or any combination between. Printers can be 400 feet or more away.

Expands as you grow

8 SXs work together to make a large network. Reconfigure the ports or plug in more memory later if you change

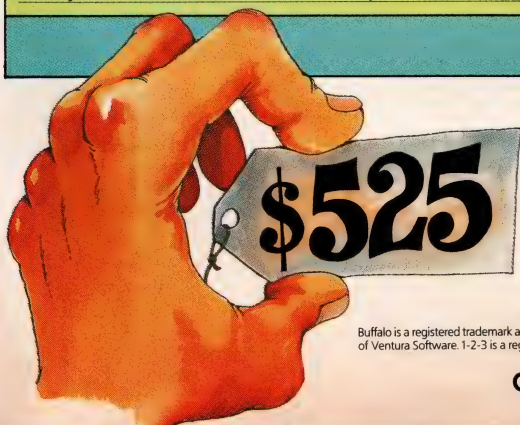
your equipment. For fewer machines, use smaller Buffalo boxes, starting around \$200. They all work together, so you'll never outgrow your investment.

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9 More than 300,000 boxes are in use worldwide. Our customers are happy because we make sure they're satisfied. Question? We answer it on our unlimited toll-free support line. Problem? We fix it free under a generous one-year limited warranty. Want to send it back? Within 45 days you can, for a full refund.

\$100 software bonus

10 With your order, we'll send free programs to speed up your system: *HyperDisk™* disk caching; *HyperKey™* keyboard enhancer; and *PrintBooster™* for 1-2-3.™ They're yours to keep, even if you return the box.



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Circle 215 on reader service card

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monitor as big as an engineer's
imagination.



MultiSync XL
Breakthrough
MultiSync technology
for CAD.

Whether your big ideas take the shape of skyscrapers or screw threads, you'll find the new MultiSync® XL the perfect monitor to display them. Especially when it's used with the graphics board that was designed to make the most of it: the MVA 1024 from NEC. Together, they give you the brilliant resolution and CAD capabilities your ideas deserve.

The XL gives you a reduced-glare 20" diagonal CRT on a tilt-swivel base, for a larger viewing area and greater comfort. And it works with a wide variety of systems from PC/XT/AT/386 to PS/2 to Mac II. The MultiSync XL automatically adjusts its scanning frequency from EGA to VGA, and on up to even higher standards with our MVA 1024 in AT/386 based machines.

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Computers and Communications

The logo for NEC Corporation, featuring the letters 'NEC' in a bold, stylized, red font with a registered trademark symbol.

Circle 222 on reader service card

NSTL TEST REPORT

IBM PS/2 Model 80-111
and AST Premium/386

The AST and IBM trade places but fail to match the Compaq's speed.

WordStar Professional

Compaq Deskpro 386/20	48
AST Premium/386	53
IBM PS/2 Model 80-111	60

dBASE III Plus

Compaq Deskpro 386/20	36
IBM PS/2 Model 80-111	38
AST Premium/386	41

1-2-3

Compaq Deskpro 386/20	14
AST Premium/386	18
IBM PS/2 Model 80-111	19

AutoCAD

Compaq Deskpro 386/20	61
IBM PS/2 Model 80-111	70
AST Premium/386	71

Lattice C Compiler

Compaq Deskpro 386/20	37
AST Premium/386	38
IBM PS/2 Model 80-111	48

seconds 0 15 30 45 60 75

The IBM PS/2 Model 80-111 and the AST Premium/386 were both tested using a 192K disk cache in extended memory. The AST Premium/386 had 1MB of RAM, an EGA, a 1.2MB floppy drive, and a 90MB hard disk. The IBM PS/2 Model 80-111 had 2MB of RAM, a 1.44MB floppy drive, and a 115MB hard disk.

WordStar Professional

Although disk access plays a small part in this benchmark, processing and memory access speeds are the most significant factors. The test measures the time required to perform four operations on a 15,364-word document.

dBASE III Plus

Disk access speed is the most significant factor for this benchmark. The test measures the time to produce a report based on a three-file join, select, and sort.

1-2-3

Because no disk access is required, this benchmark depends almost entirely on the processing and memory access speeds of the systems. In this test, a 1-2-3 macro executes a series of recalculations within a 50-by-50-cell matrix.

AutoCAD

Disk access, processing, and memory access speeds all contribute to a product's performance in this benchmark. However, the speed and type of math coprocessor used by the system are the most important factors. The test uses the sample office drawing provided with AutoCAD containing six two-dimensional and seven three-dimensional views.

Lattice C Compiler

In this benchmark, the sequential disk access rate is the most important factor. Applications such as file managers commonly rely on this type of disk access. The test measures the time required to compile and link two 1000-line programs and is performed automatically using a DOS batch file.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved

On the outside, the two computers couldn't be more different. The Model 80 is a free-standing tower with two externally accessible 3½-inch drive bays and a knockout panel for a full-height drive. The small-footprint Premium/386 offers external access for three half-height devices—perfect lodgings for a 5¼-inch floppy drive, a 3½-inch floppy, and an internal tape backup. For mass storage, the Premium/386 has enough room inside for two half-height devices, while the capacious Model 80 can hold two full-height hard disks.

AST provides several utility programs with the Premium/386, including a disk-caching program, a RAM disk, a print spooler, and an expanded memory driver (LIM 4.0). GW BASIC and DOS 3.30 are also included. IBM provides disk caching too, of course, but also some of the slickest setup, diagnostics, and system-tutorial software in the business—plus a facility for checking and adjusting arbitration levels.

Which 20-MHz machine you buy depends largely on what you anticipate your performance needs will be—and how far you peer into the future. If you're simply looking for today's top performer, get the Compaq Deskpro 386/20, which is 15 to 20 percent faster than either the Premium/386 or the Model 80. If you want limited bus-master capability, 20-MHz access to a full 13MB of RAM, and backward-compatibility with your AT boards, the Premium/386 is a perfectly viable option. But despite its high price, its low ceiling on high-speed RAM, and the current dearth of bus-master boards for the Micro Channel, the Model 80 remains the most promising platform for heavy-duty servers, workstations, and LAN gateways of the future. —Eric Knorr

WHERE TO BUY**Premium/386**

AST Research
2121 Alton Ave.
Irvine, CA 92714
714/863-1333

List price: Model 300 with 1MB RAM,

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Circle 172 on reader service card

The Tandon PAC 286 Plus offers removable hard drives, but its performance is less than dazzling.

5¼-inch floppy drive, one parallel and two serial ports, 101-key keyboard, DOS 3.30 and GW BASIC \$5195; Model 340 with 1MB RAM, 5¼-inch floppy drive, 40MB hard disk, one parallel and two serial ports, 101-key keyboard, DOS 3.30 and GW BASIC \$6295; Model 390 with 1MB RAM, 5¼-inch floppy drive, 90MB hard disk and ESDI controller, one parallel and two serial ports, 101-key keyboard, DOS 3.30 and GW BASIC \$8495; Model 3150/E with 1MB RAM, 5¼-inch floppy drive, 150MB hard disk and ESDI controller, one parallel and two serial ports, 101-key keyboard, DOS 3.30 and GW BASIC \$9795

Accessories: monochrome adapter \$195, EGA \$695, VGA \$445, 3G Plus II graphics adapter \$395, 3G Plus II ROM upgrade \$30; four 256K SIMMs (1MB total) \$595, four 1MB SIMMs (4MB total) \$7995; 3½-inch 1.44MB disk drive \$235, 5¼-inch 1.2MB floppy drive \$245, 5¼-inch 360K floppy drive \$215; 20MB hard disk \$545, 40MB hard disk \$1095, 70MB hard disk \$1595, 90MB hard disk \$2395, 150MB hard disk \$2995; hard disk controller \$280, ESDI hard disk controller \$405; 40MB internal tape backup \$695; AST MS-OS/2 \$325

Warranty: one year parts and labor
Extended warranty: available via third-party agreements

Technical support: telephone hot line, BBS

Other support services: as provided by retail dealers

For more information, see Products Featured in This Issue.

PS/2 Model 80-111

IBM
900 King St.
Rye Brook, NY 19573
800/447-4700

List price: with 20-MHz 80386, 2MB RAM, 1.44MB 3½-inch disk drive, 115MB hard disk \$10,995

Accessories: Model 8503 12-inch monochrome monitor \$250, Model 8512 14-inch color monitor \$595, Model 8513 12-inch color monitor \$685, Model 8514 16-inch color monitor \$1550; Model 8514/A graphics adapter \$1290; 1MB system board expansion module \$695, 2MB system board expansion module \$1295, 2MB memory expansion adapter \$1595, 2MB module for expansion adapter \$1295; 3½-inch internal disk drive \$170, 3½-inch external disk drive \$395, 5¼-inch external floppy drive \$335; additional 70MB hard disk \$2395, additional 115MB hard disk \$3495, additional 314MB hard disk \$6495

Warranty: one year parts and labor

Extended warranty: available through dealer

Technical support: none

Other support services: none

For more information, see Products Featured in This Issue.

Tandon PAC 286 Plus

AT-compatible system

PROS: Removable hard drives, compact design

CONS: Unimpressive speed, high price

High-density, removable-media drives like the Bernoulli Box—and even removable hard drives like the Remedy Removable—have been available as add-on PC peripherals for some time, but Tandon's \$4846 PAC 286 Plus is the first system with removable hard drives built in. Press <Alt>-1 on the keyboard, and the computer hums, whirs, and ejects its entire 30MB Personal Data Pac (PDP), to the guaranteed "oohs" and "ahs" of the office staff.

Popping hard disks in and out of the PAC 286 like VCR tapes is fun, but is it more than a gimmick? Tandon's 10.7-MHz, one-wait-



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Ours only wins in three of them.

1. How fast does it install.

We have no competition in this category. LANLink 5X installs in about fifteen minutes, and it doesn't take a technician to do it. Since LANLink 5X uses standard parallel or RS-232 serial ports, installing a network means little more than connecting the cable and loading the software.

With hardware LANs, installation can easily take two days—one to set it up and one to tweak it. And it also takes someone who really knows what he's doing. That is, someone expensive.

2. How fast does it transmit.

Okay, this is the category we don't win: the hardware LANs are generally a little quicker. At least, they are under optimal conditions, which is how they rate themselves.

But LANLink 5X is pretty quick, too. At half a megabit per second, it's way out ahead of any other software LAN, and right at the heels of the hardware types. Which, of course, are far more expensive.

3. How fast does it maintain.

The real cost of a network is not so much the initial price as it is the continuing outlay for maintenance—adapting it to changing needs. That's something LANLink 5X does practically on its own.

Running under PC-MOS/386™ or PC-DOS, it turns your server PC into a multi-tasking controller, driving a truly expandable LAN that is easily and quickly upgradable.

A hardware LAN, on the other hand, becomes obsolete as new technology is introduced. And, to keep the network up and running as applications change, you need the attentions of a technician, on a continuing basis. A very well-paid technician.

4. How fast can you pay for it.

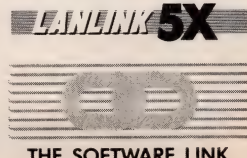
Now we've arrived at the bottom line, where LANLink 5X is toughest to beat. You can install a five-user LANLink network for about the same cost as the LAN board in a board-driven network. On top of that, factor in what you save on installation and maintenance time, and the difference is pretty dramatic.

LANLink 5X is available immediately, and it comes with a money-back guarantee. Its price of \$595 includes a server and a satellite module plus the network operating system. Additional satellites are available for \$125.

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FEATURES EVALUATION

Tandon PAC 286 Plus

With the 10.7-MHz Tandon PAC 286 Plus's two plug-in hard drives, users can take their data home for the weekend.

Standard features

CPU	80286
Clock speed	8/10.7 MHz
Built into motherboard	
Parallel port	●
Serial port	●
Floppy disk controller	●
Video adapter	○
Mouse port	○
Coprocessor support	80287

Memory capacity

Amount shipped with basic unit	1MB
Maximum installable on motherboard	1MB
Amount installable on special memory boards	4MB

Expandability

8/16-bit expansion slots/number free	4/3
8-bit expansion slots/number free	1/1
Half-/full-height storage device bays	1/2
120MB or larger hard disk available from manufacturer	○

Ergonomic design

Front-panel reset button	●
Front-panel on/off switch	●
Front-panel keyboard socket	○
ROM-based setup software	●
Tilt-and-swivel monitor	●
Compact footprint	● ¹
Complete documentation	●

● Yes ○ No

¹ Floor-standing model.

state, removable-media system may seem like a tempting choice for offices where users need to transfer 25 high-density floppies' worth of data to another computer quickly and easily or lock the hard disk in a safe overnight for higher data security. Neverthe-

less, it's a bit slow and a bit expensive; buying a removable drive and installing it in a faster, cheaper AT clone may be a more cost-effective solution.

Fully configured with 1MB of RAM, a 1.2MB 5¼-inch floppy drive, parallel and serial ports, a 101-key keyboard, two PDPs (so the machine won't be useless while one PDP is elsewhere), and an EGA and monitor, the PAC 286 costs \$4846. This is not cheap, especially compared with stand-alone upgrade alternatives. For instance, you could install two 30MB Remedy Removable Winchesters (see "Removable Resources," *PCW*, December 1987) in a fast, inexpensive 286 machine like the 12.5-MHz Dell Model 200, with EGA and color monitor, for about \$1000 less than the Tandon—if you were willing to brave tricky installation and possible maintenance problems.

The PAC 286 is an attractive, slender, vertical-standing system. It has no internal drive bays (except for its two PDP receptacles); a 1.2MB floppy drive is mounted at the top of the system unit.

The motherboard holds 1MB of memory, an 80287 math coprocessor socket, four 8/16-bit slots, and one 8-bit slot. A high-performance RLL controller for both PDPs, with 128K of cache memory, takes up one of the 8/16s. A proprietary sixth slot is designed to hold Tandon's 1MB RAM expansion board (expandable to 4MB), allowing a system maximum of 5MB without your having to use up an 8/16 slot. A serial port, a parallel port, and a floppy disk controller are built into the motherboard. While all of this is nice in terms of increased throughput and plenty of free slots, none of it is big news.

What makes the PAC 286 newsworthy is its removable drives. Each bootable, 2½-pound PDP is the size of a fat paperback novel and stores 30MB of data. The unit is a conventional two-platter, four-head, 40ms Winchester with a 2:1 interleave, secured by



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NSTL TEST REPORT

Tandon Pac 286 Plus

First place evades Tandon's PAC 286 Plus, which places second or last in each test.

WordStar Professional

AST Premium/286	106
Tandon PAC 286	123
IBM Model 50-021	125

dBASE III Plus

IBM Model 50-021	84
Tandon PAC 286	114
AST Premium/286	146

1-2-3

AST Premium/286	32
Tandon PAC 286	38
IBM Model 50-021	41

AutoCAD

IBM Model 50-021	171
AST Premium/286	179
Tandon PAC 286	211

Lattice C Compiler

AST Premium/286	91
IBM Model 50-021	95
Tandon PAC 286	100

seconds 0 40 80 120 160 200

All systems compared had processors running at 10 MHz. The Tandon PAC 286 had two removable 30MB hard drives and an RLL controller with 128K on-board cache. The IBM Model 50-021 had a single 20MB hard drive and a disk cache of 192K. The AST Premium/286 had a single 40MB hard drive and used no disk cache.

WordStar Professional

Although disk access plays a small part in this benchmark, processing and memory access speeds are the most significant factors. The test measures the time required to perform four operations on a 15,364-word document.

dBASE III Plus

Disk access speed is the most significant factor for this benchmark. The efficiency of disk caching, if present, will dramatically affect apparent disk access speed. The test measures the time to produce a report based on a three-file join, select, and sort.

1-2-3

Because no disk access is required, this benchmark depends almost entirely on the processing and memory access speeds of the systems. In this test, a 1-2-3 macro executes a series of recalculations within a 50-by-50-cell matrix.

AutoCAD

Disk access, processing, and memory access speeds all contribute to a product's performance in this benchmark. However, the speed and type of math coprocessor used by the system are the most important factors. The test uses the sample office drawing provided with AutoCAD containing six two-dimensional and seven three-dimensional views.

Lattice C Compiler

In this benchmark, the sequential disk access rate is the most important factor. Applications such as file managers commonly rely on this type of disk access. The benchmark measures the time required to compile and link two 1000-line programs. The test is performed automatically using a DOS batch file.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

rubber shock absorbers inside a plastic shell; a connector mates with an input/output/power socket in the receptacle.

While playing racquetball with your PDPs is not recommended, Tandon claims the removable drives can withstand shocks of 250 g's—not to mention normal buffeting in your briefcase. The ejection process lifts and locks the read/write heads away from the media instead of merely parking them on areas that don't have data. During our evaluation, a PDP was accidentally knocked off a desk. It landed hard, but when it was reinserted, it booted with no ill effects; all the data was intact.

Each PDP comes preformatted and loaded with Tandon DOS 3.30, GW BASIC, *Microsoft Windows 2.03*, and a LIM 4.0 driver for EMS memory. If you prefer standard DOS, Tandon provides a separate device driver for the PDP's ejection mechanism.

Thanks to its fast controller and memory cache, the PAC 286's PDPs seem to load programs about twice as fast as an XT hard disk. Once applications are loaded, however, the machine delivers only moderate performance. In NSTL tests, it outran the PS/2 Model 50 in the processor-intensive *1-2-3* and *WordStar* benchmarks but lost to the AST Premium/286; in the *AutoCAD* and *Lattice C* tests, it ran dead last.

Accessories and peripherals are no better than OK. The system's 101-key keyboard rates very well—neither too stiff nor too mushy. The monochrome monitor is acceptably sharp, but the controls are placed awkwardly at the rear. Documentation is merely adequate.

The PAC 286 would make a better impression with a lower price and higher performance. Still, its drive-swapping capability is undeniably alluring, and the rugged and convenient PDPs are a pleasure to use. The PAC 286 offers brand-name reliability, one-stop shopping, and simple setup (especially compared to the installation headaches that come with stand-alone units like the Remedy). For

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business users who need removable drives but hate going under the hood, its convenience may be irresistible. — *Eric Grevstad*

WHERE TO BUY

Tandon PAC 286 Plus

Tandon Corp.
405 Science Dr.
Moorpark, CA 93021
805/523-0340

List price: 10.7-MHz PAC 286 with 1MB RAM, 1.2MB 5¼-inch floppy drive, 101-key keyboard, one serial and one parallel port, two Personal Data Pac receptacles (no PDPs, video board, or monitor) \$3199

Accessories: 30MB Personal Data Pac hard disk drive \$399; EGA adapter \$250; monochrome monitor \$190, EGA monitor \$599; 1MB memory expansion board \$400, 4MB memory expansion board \$1900

Warranty: one year parts and labor

Extended warranty: none

Technical support: handled through dealers

Other support services: none

For more information, see Products Featured in This Issue.

Epson LQ-1050

24-pin dot matrix printer



PROS: High speed, advanced paper handling

CONS: Unreliable sheet feeder, occasional paper jams

By now, most people have encountered TANSTA AFL, the acronym for There ain't no such thing as a free lunch. But how about TANSTA APDMP—There ain't no such thing as a perfect dot matrix printer? Setting aside specialized requirements like color and desktop publishing capabilities, such a dream machine would have to provide high speed, exemplary print quality, state-of-the-art paper handling, easy envelope printing, convenient operation, and low cost. Impossible, right?

Maybe, but Epson's new 24-pin printer, the \$1199 LQ-1050 (the LQ-850, a narrow-carriage version, costs \$849) comes astonishingly close. If not for an unfortunate tendency toward paper jams, the LQ-1050 would

rate as the best dot matrix printer this reviewer has ever used.

When it comes to meat-and-potatoes issues like speed and print quality, the LQ-1050 is unassailable. In draft mode it blasts out a 250-word, 24-line page in 13 seconds flat; the same page takes only 28 seconds in near letter quality mode (NLQ). Two fonts are built in—a stylish roman and a clean, elegant sans serif. Draft output (always sans serif) is easily readable; in NLQ mode both fonts are almost indistinguishable from typed copy.

Print flexibility and ease of use are exemplary. The printer delivers 5-, 6-, 7-, 10-, 12-, 15-, 17.5-, and 20-pitch type (if your word processor knows how to ask for them) and gives you a choice of 6 or 8 lines per inch. You can select 10, 12, and 15 pitch and proportional spacing from the easy-to-use push-button control panel as well. Likewise, form-feed, linefeed, and paper loading are simple push-button operations.

The LQ-1050 offers a remarkable set of paper-handling features. The most impressive is its automatic paper roll-up: When a print job is done, the printer advances the fanfold paper about a quarter of a page for easy tear-off. When the next print job starts, the paper rolls back into printing position. You'll never waste another sheet.

Paper parking is reliable and easy. Three button-pushes and one pull on a lever roll out the fanfold paper and load a cut sheet or envelope. Paper positioning is fully automatic and—unlike most auto-feed printers, which load paper an inch above the printhead—the LQ-1050 places the top edge of the paper precisely where it should go: at the printhead.

The LQ-1050 prints envelopes perfectly; all you need to do is adjust the paper-thickness dial. So much for printer manufacturers who claim that 24-pin printers are incapable of this essential office task.

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\$149

TURBO-COOL 200

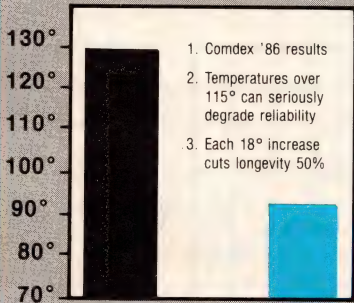


HIGHEST
PERFORMANCE

- PC/XT/Mini AT compatible
- 200 watts of power
- system runs 30°-45° cooler
- standard noise level

\$189

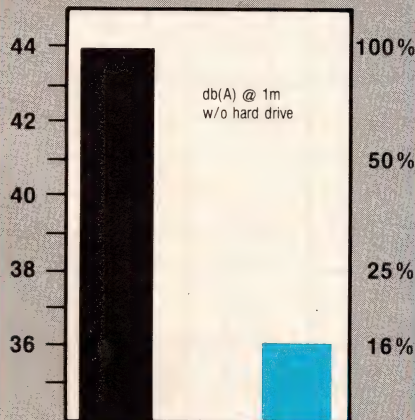
EXPANSION CARDS TEMPERATURE TEST



Ordinary XT
Power Supply

TURBO-COOL
Power Supply

NOISE LEVELS



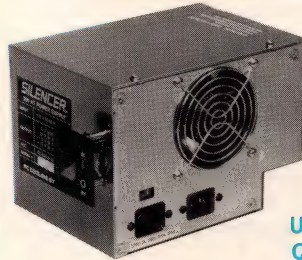
Ordinary XT
Power Supply

SILENCER
Power Supply

TURBO-COOL AND SILENCER POWER SUPPLIES: POWER PACKED AND BUILT TO LAST

- full rated power
- low ripple; tight reg.
- heavy duty components
- FCC-B compliance
- UL (#E114179:TC150/200)
- OV, OC, SC protection
- patented twin fan slope-cover design for max. cooling vs noise (TC150/200)
- high capacity West German cooling fan w/adjustable speed control (TC250)
- installation instructions; 4 drive plugs
- rigorously tested; 1 yr. warranty

SILENCER 200



ULTRA
QUIET

- AT compatible
- 200 watts of power
- adjustable cooling (1.0X-1.3X)
- 69% noise reduction @ 1.0X

\$169

TURBO-COOL 250



HIGHEST
PERFORMANCE

- AT compatible
- 250 watts of power
- adjustable cooling (1.3X-1.8X)
- 386 boards and hard drives run up to 35° cooler

\$189

ALSO AVAILABLE

- Computer Replacement Fans (West German & Japanese) \$29
- Turbo-Cool PC/XT Auxiliary Cooling Unit (system runs 15°-30° cooler) \$59
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- Compaq 150W Power Supply (upgrades the original portable) \$169
- Turbo-Cool 150X Industrial Power Supply (92% dust reduction) \$195
- Custom Turbo-Cool Power Supplies (remote on/off, special loading, etc.) . . . CALL

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- CP—copy-protected; NCP—not copy-protected.

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We only carry the latest versions of products. Version numbers in our ads are current at press time.

- Alpha Software ... NCP**
 - Keyworks 3.0 (macros) \$59.
 - Advanced Keyworks 1.0 175.
 - ALPHA/three 1.1 (dBase file compatible) ... 219.
- American Small Business Computers**
 - Design CAD 3.0 (NCP) 159.
 - Design CAD 3D 1.1 (NCP) 159.
- Application Techniques ... NCP**
 - ▣ Pizazz Plus 75.
- Ashton-Tate ... NCP**
 - dBASE III Plus 1.1 call
 - ▣ MultiMate Advantage II 1.0 299.
 - Master Graphics Pack 299.
- Best Programs ... NCP**
 - Label Master 3.1 (mailing label program) .. 29.
- Bible Research ... NCP**
 - THE WORD 4.0 (specify KJV or NIV) 159.
- Bloc Development ... NCP**
 - FormTool 2.01 59.
- Borland International ... NCP**
 - Turbo BASIC 1.1 67.
 - Turbo C 1.5 67.
 - Turbo Pascal 4.0 67.
 - Superkey 1.1 67.
 - Reflex 1.1 99.
 - Eureka 1.0 109.
 - ▣ Sidekick Plus 1.0 129.
 - ▣ Quattro 1.0 w/SQZ!Plus 1.0 159.
 - ▣ Paradox 2.0 (easy-to-use database) call
- Broderbund ... CP**
 - Print Shop 35.
 - Print Shop Companion (tools for Print Shop) 33.
 - Memory Mate 3.0 (NCP) 45.
- Chipsoft ... NCP**
 - ▣ Tally Ho 1.01 (financial calculator) 32.
- Computer Associates ... NCP**
 - ▣ SuperCalc 4 1.1 299.
- Crosstalk Communications ... NCP**
 - Crosstalk XVI 3.61 95.
 - Crosstalk MK.4 1.0 129.
- Dac Software ... NCP**
 - Dac-Easy Payroll 3.0 59.
 - Dac-Easy Light 1.0 45.
 - Dac-Easy Accounting 3.0 59.
 - Dac-Easy Bonus Pak 3.0 115.
- Digital Research ... NCP**
 - Gem Draw Plus 2.01 189.
 - Gem Desktop Publisher 1.1 259.

PC Connection Software Special

through August 31, 1988

North Edge Software ... NCP

□ Timeslips III 3.3

Rated 9.3 by InfoWorld, Timeslips III is a memory-resident time and billing system for lawyers, accountants, consultants and other professionals. A built-in "stop-watch" times any phone call or activity as you work. Then automatically calculates the fee and updates your client file.

- Use the 2,000 character description field for narrative bills
 - Procedural macros automate report and billing functions
 - The Custom Report Generator exports data to any program that accepts ASCII files like Lotus 1-2-3 and dBASE
- For XT, AT, PS/2, and compatibles (requires 512k, 1 floppy & 1 hard drive; 3 1/2" available) \$119.

Executive Systems ... NCP

□ XTREE Pro 1.0 69.

5th Generation ... NCP

▣ Fastback Plus 1.01 99.

Funk Software ... NCP

□ Sideways 3.21 42.

▣ Inword 1.0 59.

▣ Worksheet Utilities 1.0 59.

Generic Software ... NCP

▣ Generic CADD Level 3 109.

□ Dot Plot 35.

□ Basic Home Design 35.

□ Drafting Enhancements 35.

Harvard Associates ... NCP

PC LOGO 2.0 89.

Hayes ... NCP

□ Smartcom II 3.0 89.

Hilgraeve Software ... NCP

□ HyperACCESS 3.2 89.

Individual Software ... NCP

▣ Directory Assistance 1.0 33.

□ Professor DOS (with Smartguide) 33.

Intuit ... NCP

□ Quicken 2.0 35.

Javelin Software ... NCP

□ Javelin Plus 2.01 159.

Lifetree ... NCP

▣ Total Word 1.0 259.

Lotus ... NCP

□ 1-2-3 2.01 (now not copy-protected) call

□ Symphony call

▣ Metro call

MacroPac International ... NCP

101 Macros for:

1-2-3 dBASE III Plus WordPerfect

Excel each 42.

MECA ... CP

□ Managing Your Money 4.0 \$129.

Meridian Technology ... NCP

□ CarbonCopy Plus 5.0 119.

Microlytics ... NCP

□ Gofer 1.0 (text retrieval system) 45.

□ Wordfinder 4.0 (electronic thesaurus) 35.

MicroPro ... NCP

□ WordStar Professional Release 5 259.

□ WordStar 2000 Plus Rel. 3 (Personal Ed.) 259.

Microrim ... NCP

▣ R:BASE for DOS (version 2.1) 449.

R:BASE for OS/2 (3 1/2" disks only) 599.

Microsoft ... NCP

□ Learning DOS (for any DOS version) 35.

□ Windows 2.03 69.

▣ Works 1.0 119.

▣ Windows 386 129.

Bookshelf 1.0 w/Amdek Laser Drive 799.

▣ Word 4.0 209.

▣ Excel 2.0 (requires 80286/80386 CPU) 319.

LANGUAGES

□ Quick BASIC 4.0 69.

□ Quick C 1.0 69.

▣ Macro Assembler 5.0 99.

▣ C Compiler 5.1 299.

Migent ... NCP

▣ Ability Plus 1.0 149.

Monogram ... NCP

□ Dollars & Sense 3.1 105.

Nantucket Software ... NCP

▣ Clipper (Summer '87, dBase Plus compiler) 399.

New England Software ... NCP

▣ Graph-in-the-Box Release 2 75.

Nolo Press ... NCP

▣ WillMaker 3.0 35.

North Edge Software ... NCP

□ Timeslips III 3.3 special

Owl International ... NCP

□ Guide 2.0 143.

Paperback Software ... NCP

□ VP-Planner Plus 2.0 95.

□ VP-Info 1.4 65.

□ VP-Expert 1.2 (expert system) 65.

Paul Mace ... NCP

□ H/Test-H/Format 2.0 (hard-disk tools) 49.

□ Mace Utilities 4.1 (DOS utilities) 59.

Personal Computer Support Group

▣ Lucid 3-D 1.22 89.

Personics ... NCP

▣ SmartNotes 2.0 49.

▣ SeeMORE 1.0 49.

▣ @BASE 1.1 119.

Peter Norton ... NCP

▣ Norton Utilities 4.0 55.

▣ Norton Guides (C, Assembler, Basic) each 55.

▣ Advanced Utilities 1.0 85.

Quarterdeck ... NCP

□ DESQView 2.01 (operating environment) 79.

□ Expanded Memory Manager 4.1 39.

Revolution Software ... NCP

▣ Cruise Control 3.02 39.

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Each year the local color gathers on the green of memorable Marlow, NH (pop. 554) to pay their respects to our furry founder. We wave our flags, doff our hats, toot our own horns, and gather renewed strength for another year of lofty service. For it was he (or was it she?) who had the voluminous vision and towering talent to lead Marlow onto the cutting edge of micro mail order.

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Smartmodem 2400	\$449.
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Hercules ... 2 years	
Graphics Card Plus	189.
Network Card Plus (with TOPS DOS)	349.
Intel ... 5 years	
2400B Modem 2 (internal modem for PS/2 Models 50/60/80)	279.
Inboard 386/PC w/1 Meg	989.
Inboard 386/AT 0k (req. installation kit)	969.
Inboard Installation Kit (specify computer)	139.
Aboveboard 286 512k	389.
Aboveboard PS/286 512k S/P	419.
AboveBoard 2 0k (for MicroChannel)	279.
8087 (for IBM-PC & XT)	114.
8087-2 (for PS/2 Models 25 & 30)	159.
80287 (for AT & XT286)	195.
80287-8 (for 8 MHz 80286 machines)	249.
80287-10 (for PS/2 Models 50 & 60)	319.
80387 (for 16 MHz PS/2 Model 80)	499.
80387-20 (for 20 MHz PS/2 Model 80)	749.
Kensington Microware ... 1 year	
Masterpiece	94.
Masterpiece Plus	109.
key tronic ... 3 years	
101 Keyboard (enhanced layout)	99.
Kraft ... 1 year	
Three-button Joystick	33.
KYE International ... 1 year	
Genius Mouse Model GM-6 Plus	59.
Microsoft ... lifetime	
SPECIFY BUS OR SERIAL VERSION	
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Migent ... 1 year	
Pocket Modem (1200 baud, incl. software)	119.
MSC Technologies ... lifetime	
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PC Mouse w/PC Paint+	89.
PC Mouse w/Autosketch	105.
NEC ... 2 years	
Multisync II (800 x 560 max. resolution)	call
NSI Logic ... 3 years	
Epic 480 (extended EGA)	135.
Smart EGA Plus (supports 800x600 res.)	169.
Orchid Technologies ... 2 years	
Tiny Turbo 286	289.
Designer VGA	349.
PC Cooling Systems ... 1 year	
REPLACEMENT POWER SUPPLIES	
Turbo Cool 150 (run 25° - 40° cooler)	129.
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1200 Baud Internal Modem (w/ProComm)	69.
1200 Baud External Modem	109.
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2400 Baud External Modem	159.
Princeton Graphics ... 1 year	
MAX-12E (amber monochrome monitor)	139.

Ultrasync (supports CGA, EGA, VGA)	\$549.
Quadram ... 2 years	
ProSync (with mouse)	259.
Microfazer II Print Buffer 64k	249.
Toshiba ... 1 year	
P321SL printer (80 col., 216 cps, w/tractor)	529.
P351SX printer (136 column, 216 cps)	999.
T1000 Laptop (80C88, 6.4 lbs., 5 hr. battery)	call
T1200 Laptop (80C86, 10 MHz, 20 Meg)	call
T1200F Laptop (80C86, 10 MHz, 2 floppies)	call
T3100/20 Laptop (80286, 8 MHz, 20 Meg)	call
T3200 Laptop (80286, 12 MHz, 40 Meg)	call
T5100 (80386, 16 MHz, 40 Meg)	call
768k Ram Card for T1000	299.
Video 7 ... 2 years	
VEGA Deluxe (supports 640x480)	209.
VEGA VGA (supports full VGA specs)	call

DRIVES

IOMEGA ... 1 year	
Bernoulli II Single 20 Meg Internal (5 1/4") special	
Bernoulli II Dual 20 Meg External (5 1/4") special	
20 Meg cartridge (5 1/4")	59.
Bernoulli Box 40 Meg (8")	1679.
20 Meg cartridge (8")	82.
PC2 Card	special
PC2B Card (bootable card for PC/XT/AT)	special
PC4 Card (for PS/2 Model 50/60/80)	special
Mountain Computer ... 1 year	
40 Meg Internal Tape Drive (XT, AT or PS/2)	379.
40 Meg External Tape Drive (XT, AT or PS/2)	479.
40 Meg External Tape Drive w/Power Supply (XT, AT or PS/2)	569.
Plus Development ... 1 year	
Hardcard 20 Meg (49 ms)	569.
Hardcard 40 Meg (39 ms)	725.
Seagate ... 1 year	
FREE PCTV® Hard Drive Installation Tape with the purchase of 20 Meg Seagate drive for the IBM PC (not for AT). Specify Beta or VHS.	
20 Meg Internal Hard Drive ST225 (w/controller and cables, 65 ms)	299.
30 Meg Internal Hard Drive ST238 (w/controller and cables, 65 ms)	329.
40 Meg Internal Hard Drive for AT (40 ms)	439.
40 Meg Internal Hard Drive for XT (w/controller and cables, 40 ms)	499.
TEAC ... 1 year	
PC, XT 360k Drive (5 1/4" half-height)	99.
720k Drive (3 1/2" half-height, specify XT or AT)	99.
Toshiba ... 1 year	
AT 360k Drive (5 1/4" half-height)	99.

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Marlow, NH 03456
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DISKS

All disks have a lifetime warranty.	
5 1/4" DS/DD Disks for PC & XT (360k)	
Fuji MD2D (10 disks per box)	\$12.
Sony (10 disks per box)	12.
Maxell MD2-D (10 disks per box)	13.
Verbatim Datalife (10 disks per box)	13.
5 1/4" DS/High Density Disks for AT (1.2 Meg)	
Fuji MD2HD (10 disks per box)	22.
Sony (10 disks per box)	23.
Maxell MD2-DD (10 disks per box)	23.
Verbatim Datalife (10 disks per box)	22.
3 1/2" DS/DD Diskettes (720k)	
Sony (10 disks per box)	18.
Fuji (10 disks per box)	19.
Maxell (10 disks per box)	20.
3 1/2" DS/High-Density Diskettes (1.44 Meg)	
Fuji (10 disks per box)	55.
Maxell (10 disks per box)	59.

MISCELLANEOUS

CompuServe	
CompuServe Information Service	24.
Grolier's OnLine Encyclopedia	32.
Cables ... lifetime	
Smartmodem-to-AT cable (9 feet)	15.
Parallel Printer cable (15 feet)	19.
PC Connection Computer Toolkit	22.

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- Note:** Accounts on net terms pay actual shipping.
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Simon & Schuster ... NCP	
□ Typing Tutor IV	\$33.
□ New World Writer II 1.0	89.
Softlogic Solutions ... NCP	
□ Software Carousel 2.02	49.
□ Disk Optimizer 4.0	45.
Software Publishing ... NCP	
□ PFS: First Publisher 2.0	79.
□ PFS: First Choice 2.0	89.
□ PFS: Professional Write 2.0	119.
□ PFS: Professional File 1.01	149.
□ Harvard Graphics 2.1	299.
□ Harvard Graphics Accessories also available	call
□ Harvard Total Project Manager II	379.
Symantec/Turner Hall ... NCP	
□ SQZ!Plus 1.01	59.
□ 4Word 2.0	59.
□ Q & A Write 1.01	119.
□ Grandview 1.0	175.
□ Q & A 3.0 (database, word processor)	209.
□ Breakthrough Timeline 3.0	349.
TOPS ... NCP	
Flashcard (AppleTalk network card; 1 yr. warranty)	169.
NetPrint 1.08 (share printers)	119.
TOPS 2.0	119.
Traveling Software ... NCP	
□ LAP-LINK Plus 1.0	85.
□ Desklink	99.
True BASIC, Inc. ... NCP	
□ True BASIC 2.01 (now includes Runtime)	57.
Vericomp ... NCP	
□ SoftBytes 2.0	35.
□ SoftBytes 386 2.36	49.
WordPerfect Corp. ... NCP	
□ WordPerfect Library 2.0	69.
□ WordPerfect 5.0	255.
□ DataPerfect 2.0	299.
WordTech Systems ... NCP	
□ dBOX 1.2	119.
Xerox ... NCP	
□ Ventura Publisher 1.1	549.

EDUCATIONAL

Barron's ... CP	
Computer SAT	35.
Stone & Assoc. ... NCP (reqs. graph. brd.)	
My Letters, Numbers, Words (ages 2 to 6)	27.
Kids Stuff (ages 2 to 6)	27.
True BASIC, Inc. ... NCP	
□ Trigonometry	32.
□ Algebra	32.

RECREATIONAL

Accolade ... CP (reqs. graphics brd.)	
□ Hardball (baseball simulation)	11.
□ Testdrive (driving simulation)	24.
Electronic Arts ... CP (reqs. graphics brd.)	
Chessmaster 2000	32.

PC Connection Hardware Special

through August 31, 1988

IOmega ... 1 year Bernoulli Box II

The Bernoulli Box from IOMEGA has long been a favorite solution for your mass storage needs. Because it uses removable data cartridges, storage is unlimited, and your valuable data can be locked up for better security. With the Bernoulli Box II, IOMEGA's newest product using 5 1/4" cartridges, you have the choice of mounting internally or externally. We are an authorized IOMEGA service center.

- Interface Cards available for all system configurations, including PS/2.
- Internal 20 Meg (req. interface) . . . \$779.
- External 20 Meg (req. interface) . . . 1059.
- External 40 Meg (req. interface) . . . 1679.
- INTERFACES**
- PC2 (PC, XT, AT) . . . 169.
- PC2B (bootable card) . . . 229.
- PC3B (non-networking) . . . 169.
- PC4 (PS/2 Microchannel) . . . 299.

□ Chuck Yeager's Flight Simulator	32.
Infocom ... NCP	
Hitchhiker's Guide	12.
Zork Trilogy	33.
Microprose ... CP	
□ F-15 Strike Eagle (requires CGA)	22.
□ Gunship (requires CGA or EGA)	32.
Microsoft ... CP	
□ Flight Simulator 2.13 (reqs. graphics brd.)	35.
Mindscape ... CP	
□ Balance of Power (reqs. graphics brd.)	30.
Parlor Software ... CP	
□ Bridge Parlor (best Bridge simulation)	49.
Sierra On-Line ... CP	
□ Leisure Suit Larry (requires CGA or EGA)	25.
□ Space Quest II (requires CGA or EGA)	33.
□ King's Quest III (requires CGA or EGA)	33.
□ Police Quest (requires CGA or EGA)	33.
Sphere, Inc. ... NCP	
□ Tetris (addicting mind teaser)	24.
□ Falcon (F-16 simulation, reqs. graphics brd.)	32.
Sublogic ... NCP	
□ Jet 2.1 (requires EGA or CGA)	33.
XOR ... NCP	
□ NFL Challenge	69.

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PC Connection

6 Mill Street
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510W

HARDWARE

Manufacturer's standard limited warranty period for items shown is listed after each company name. Some products in their line may have different warranty periods.

AST Research ... 2 years

I/O Mini 2 C/S/P	\$89.
SixPakPlus 64k C/S/P	call
(now upgrades to 576k)	call
SixPakPremium 256k C/S/P	call
(upgrades to 1 Meg or 2 Meg w/Piggyback)	call
Advantage Premium 512k S/P	call
(upgrades to 1 Meg or 2 Meg w/Piggyback)	call
Advantage 2 512k (for PS/2)	call
HMPage! 286 512k (upgrades to 2 Meg)	call
Hot Shot 286 (10 MHz)	399.

Amdek ... 1 year

410A (amber monochrome monitor)	159.
LaserDrive-1 (CD-ROM Drive; 90-day wrty.)	629.

Compucable ... 2 years

2-Position switch box	29.
3-Position switch box	39.

Cuesta ... 1 year

Datasaver 400 Watt (standby power unit)	459.
---	------

Curtis ... lifetime

ACCESSORIES

Disk Holder DB-1 (holds 50 5 1/4" disks)	8.
Printer Stand PS-1	18.
Universal System Stand SS-3	25.
DS-1 Switch Box (controls 2 printers)	33.

CABLES

Smartmodem-to-PC Cable (9 feet)	17.
Printer-to-IBM cable (9 feet)	17.

SURGE SUPPRESSORS

Safestrip SP-3 (6 outlets; 1 year wrty.)	21.
Diamond SP-1 (6 outlets)	32.
Ruby (6 outlets; EMI/RFI filtered; 6 ft cord)	59.
Ruby-Plus (w/FAX & modem protection)	69.

DCA ... 1 year

Irma 2 (3270 emulation board)	729.
-------------------------------	------

Epson ... 1 year

We are an authorized Epson Service Center.

FX-850 (80 col., 264 cps, 9 pin)	call
FX-1050 (136 col., 264 cps, 9 pin)	call
LQ-500 (80 col., 180 cps, 24 pin)	call
LQ-850 printer (80 col., 264 cps, 24 pin)	call
LQ-1050 printer (136 col., 264 cps, 24 pin)	call
LQ-2500 printer (136 col., 324 cps, 24 pin)	call
LX-800 printer (80 col., 180 cps, 9 pin)	call
Printer-to-IBM cable (6 feet)	15.

Everex ... 1 year

1200 Baud Internal Modem	79.
2400 Baud Internal Modem	149.

5th Generation ... 6 months

Logical Connection 256k	459.
Logical Connection 512k	499.

Hayes ... 2 years

Smartmodem 1200	299.
Smartmodem 1200B (with Smartcom II)	299.
Smartmodem 1200B (no software)	265.

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PC CONNECTION®

ALL ITEMS SUBJECT TO AVAILABILITY. PRICES SUBJECT TO CHANGE WITHOUT NOTICE.

The only problem with the LQ-1050 is that the emerging sheet of paper tends to catch on the front edge of the single-sheet paper guide, causing a jam that requires you to clear and rethread the entire paper path. One solution is to remove the paper guide completely; replacing it takes only a few seconds when you need to print on cut sheets. A more elegant solution is to spend \$249 for Epson's sheet feeder (the narrow-carriage version is \$199). With the sheet feeder installed, you can remove the paper guide permanently. Unfortunately, the sheet feeder adds about 9 seconds per page to the printing time and does not always feed sheets reliably.

Still, despite its paper jam problems, the Epson LQ-1050 delivers an extremely attractive combination of speed, print quality, envelope printing, advanced paper-handling, and price. IBM's Proprinter XL24 offers comparable speed and price but lacks envelope capability and sophisticated paper handling. Toshiba's P341SL is a bit cheaper, but it won't print envelopes, and it's significantly slower. So, TIAAPDMP (There is an *almost* perfect dot matrix printer). The LQ-1050 may not be flawless, but in an imperfect world it comes closer than any other printer in its price range. —M. G.

WHERE TO BUY

Epson America

2780 Lomita Blvd.
Torrance, CA 90505
213/539-9140

List price: LQ-1050 with 6K buffer, push tractor, battery backup \$1199; LQ-850 (narrow-carriage) \$849

Accessories: font modules \$59; wide-carriage sheet feeder \$249, narrow-carriage sheet feeder \$199; wide-carriage pull tractor \$74, narrow-carriage pull tractor \$59; wide-carriage ribbon \$15, narrow-carriage ribbon \$9

Warranty: one year limited parts and labor

Extended warranty: \$79.95 per year, renewable

Technical support: dealer only
For more information, see Products Featured in This Issue.

Micronics 1616-01, 2016-01, 2020-01

80386 motherboards

PROS: 20-MHz board is very fast

CONS: Expensive, limited memory expansion with 20-MHz board

If you use an AT for CPU-intensive applications like desktop publishing, computer-assisted design, or updating megabyte-size 1-2-3 worksheets, you probably spend aeons of waiting time staring at your screen and dreaming of an 80386 machine. But there's an alternative: Replace the soul of your machine with an 80386 accelerator board or a new 80386 motherboard. Either upgrade will deliver faster performance and at least the possibility of running OS/2, Windows/386, or Xenix. The motherboard option costs about \$1000 to \$1500 more, and installation takes a bit more trouble, but a 386 motherboard provides a 32-bit data bus for faster throughput, greater memory expandability, and expanded software compatibility. Furthermore, transplanting a 386 motherboard into an AT requires only a screwdriver, a pair of needle-nose pliers, and 45 minutes of the time you'll save later on.

Micronics makes three 80386 motherboards designed specifically for upgrading the IBM AT (and machines with the same form factor)—and if your time is expensive, they are worth every penny. The 1616-01 (\$1995) runs at 16 MHz; both the 2016-01 (\$2250) and 2020-01 (\$2550) run at 20 MHz. The more expensive 20-MHz board comes with an 80386 CPU certified by Intel to run at 20 MHz; the cheaper one uses an 80386 certified by Micronics to run at 20 MHz. Other than that, the two are identical; we experienced no difficulties with the 2016-01. All three can be toggled down to a lower speed for older software and games, come with 1MB of 32-bit RAM, offer zero-wait-state operation, five 8/16-bit slots, two 8-bit slots, and one 32-bit expansion slot—and run IBM OS/2. They are socketed for the 80287 math coprocessor but require a separate (and expensive) daughterboard to use the faster 80387.

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Specifications: FEATURES: free-form & predefined windows, scrolling within window, import & export to files & screens, cut & paste, auto word wrap, time & date stamp, move & join & dup windows, mono or selectable color, definable Hot-key or non-resident, unloadable, LAN support, context help, extended ASCII, smart fully adjustable windows, parallel text processing, progressive resolution and "and-or-not" like searching without keywords, and more. **COMPATIBILITY:** IBM-PC/XT/AT/PS2 and compatibles; mono, CGA, 80 col EGA, and Hercules displays; 60K minimum RAM **CAPACITY:** Up to 500 windows and 50K per pile - 50 piles. Not copy protected.

YES, send me

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FEATURES EVALUATION

Micronics 80386 Motherboards

Micronics' 16-MHz 80386 motherboard offers greater memory expansion capability than the company's 20-MHz boards—and a price hundreds of dollars lower. Of course, if performance is the issue, either 20-MHz board is more desirable.

	1616-01	2016-01	2020-01
Standard features			
Price	\$1995	\$2250	\$2550
CPU	80386	80386-16	80386-20
Clock speed	16 MHz	20 MHz	20 MHz
Built into motherboard			
Parallel port	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Serial port	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Floppy disk controller	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Video adapter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coprocessor support	80287/ 80387	80287/ 80387	80287/ 80387
Complete documentation	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
32-bit memory capacity			
Amount shipped with basic unit	1MB	1MB	1MB
Maximum installable	10MB	4MB	4MB
Expandability			
32-bit expansion slots	1 ¹	1 ¹	1 ¹
8/16-bit expansion slots	5	5	5
8-bit expansion slots	2	2	2
Number of slots occupied	1 (32 bit)	1 (32 bit)	1 (32 bit)

● Yes ○ No

¹ For memory expansion only.

These motherboards are fast. In a recent NSTL survey of four 80386 motherboards, the Micronics 20 MHz took first place in every event. The 16-MHz board held third place in every test except *AutoCAD*—where it came in second.

Like most 386 motherboards, the Micronics boards have separate 32-bit memory and I/O buses; this division of labor allows the memory bus to run at full CPU clock speed while the expansion bus ticks along slowly enough to suit peripherals. Expansion I/O slots on the 16-MHz board run at 8 MHz; those on the 20-MHz models run at 10 MHz. While 10 MHz is pretty speedy, Micronics says its clients have encountered few compat-

ibility problems. A few older XT boards—notably cheap monochrome video adapters—have problems at 10 MHz, but I/O boards and disk controllers seem to do just fine.

Micronics offers a choice between the Award BIOS and the Phoenix BIOS—or both! These motherboards offer an unusual capability: socketing two BIOS's simultaneously and switching between them with a software utility. Most users will never need this feature, but if you want to run two applications that require different BIOS's, it might save your skin.

The boards are less impressive in the memory-expansion department. All three come with a 32-bit memory board that holds 1MB of static column RAM, plus sockets for an additional 1MB. The memory board for the 16-MHz motherboard accommodates up to 8MB of additional 32-bit RAM on piggyback boards; unfortunately, the 20-MHz memory board permits only 2MB of piggyback 32-bit RAM, for a miserly 4MB ceiling.

Setting up the boards is simplicity itself, thanks to well-written documentation with clear illustrations. You must set a jumper on the memory board to indicate how much memory is installed; all additional settings can be made with one easy-to-reach DIP switch block. The boards come with a setup utility, software that lets the user select simulated clock rates of 4.77-, 6-, 8-, and 16-MHz from the keyboard, and a driver for Lotus/Intel/Microsoft LIM 4.0 expanded memory.

If you're looking for performance, the 20-MHz motherboards will change the way your AT does business, and even the slower 16-MHz model will make a big difference in computation-intensive applications. None of the boards is cheap, but when time is money, any one of them can save you a bundle.

—Lewis Perdue

WHERE TO BUY

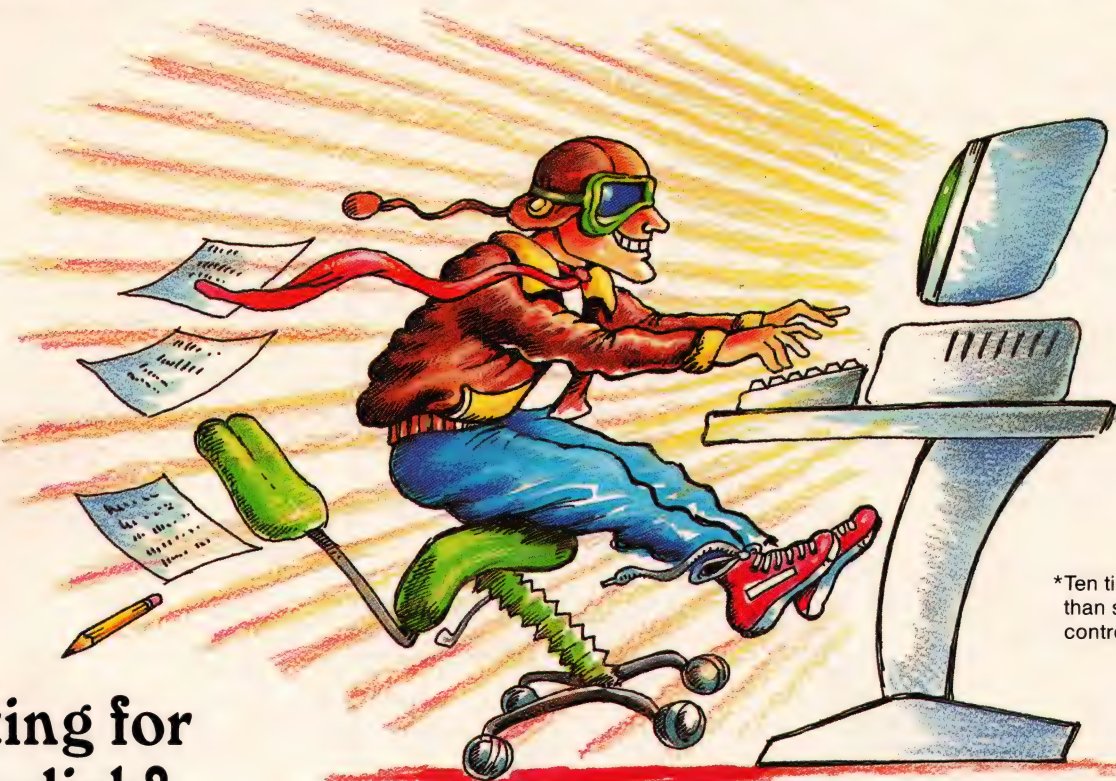
Micronics 1616-01, 2016-01, 2020-01

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293 Plus 240 CPS, 100 NLQ	575
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CMS 5¼" ext. 1.2 mb for PS/2	259
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Toshiba 5¼" 1.2 mb int.	110
Micropolis 70 mb	695
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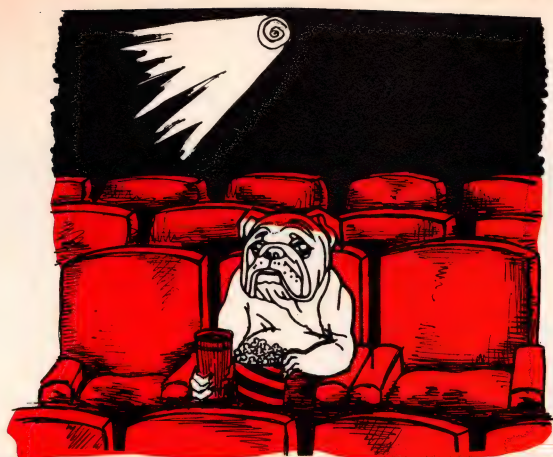
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NSTL TEST REPORT

386 Motherboards

The 20-MHz Micronics 2016 and 2020 snap up the speed crown, while the 16-MHz 1616 comes in a respectable third.

WordStar Professional

Micronics 2016/2020	75
Mylex	75
Micronics 1616	84
Fortron	91

dBASE III Plus

Micronics 2016/2020	143
Mylex	151
Micronics 1616	156
Fortron	162

1-2-3

Micronics 2016/2020	18
Mylex	20
Micronics 1616	23
Fortron	25

seconds 0 30 60 90 120 150

All motherboards were tested on an IBM PC AT model 339 with a 30MB hard disk and an IBM EGA board with 256K of video RAM.

WordStar Professional

Although disk access plays a small part in this benchmark, processing and memory access speeds are the most significant factors. The test measures the time required to perform four operations on a 15,364-word document.

dBASE III Plus

Disk access speed is the most significant factor for this benchmark. The test measures the time required to produce a report based on a three-file join, select, and sort.

1-2-3

Because no disk access is required, this benchmark depends almost entirely on the processing and memory access speeds of the systems. In this test, a 1-2-3 macro executes a series of recalculations within a 50-by-50-cell matrix.

AutoCAD

Micronics 2016/2020	95
Micronics 1616	113
Fortron	122
Mylex	148

Lattice C Compiler

Micronics 2016/2020	64
Mylex	66
Micronics 1616	72
Fortron	78

seconds 0 30 60 90 120 150

AutoCAD

Disk access, processing, and memory access speeds all contribute to a product's performance in this benchmark. However, the speed and type of math coprocessor used by the system are the most important factors. The test uses the sample office drawing provided with AutoCAD containing six two-dimensional and seven three-dimensional views and measures the time required to retrieve and display the drawing, zoom in on a small detail within the drawing, zoom out to reveal the entire drawing, and print the entire drawing. All of the views are then displayed in the last step of the benchmark.

Lattice C Compiler

In this benchmark, the sequential disk access rate is the most important factor. Applications such as file managers commonly rely on this type of disk access. The benchmark measures the time required to compile and link two 1000-line programs. The test is performed automatically using a DOS batch file.

Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.

800/234-4386, 408/732-0940

List price: model 1616-01 (16-MHz board) with 1MB RAM \$1995, model 2016-01 (20-MHz board—Micronics certified) with 1MB RAM \$2250, model 2020-01 (20-MHz board—Intel certified) with 1MB RAM \$2550

Accessories: 2MB piggyback memory board with RAM \$1195; for 16-MHz motherboard only, 4MB piggyback memory board with RAM \$2495, 8MB piggyback memory board with RAM \$4995; 80387-16 math coprocessor and adapter board \$895

Warranty: one year parts and labor

Extended warranty: none

Technical support: toll-free number for registered users, M–F 8:30–5:30

Other support services: free monthly newsletter

For more information, see Products Featured in This Issue.

Eric Knorr is a senior editor for PC World. Eric Grevstad is a New Hampshire-based computer journalist specializing in high-end portables and low-end software. Lewis Perdue is the editor and publisher of PC Management Letter. ●



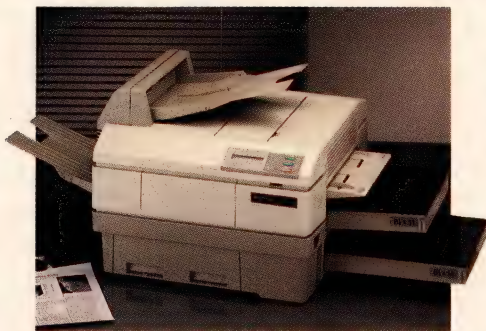
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164 **SideKick Plus**

An early love of busy PC users, *SideKick* has developed new notepad and communications features as it evolves into a multitasking environment.

168 **Info-XL 1.0**

Cresting the new wave of information management programs, *Info-XL* is a handy tool for keeping track of notes about people and projects.

174 **Turbo Pascal 4.0**

Borland's new Pascal compiler features a comfortable programming environment, good performance, and excellent graphics support.

180 **Show Partner F/X 3.0, IBM Storyboard Plus 1.0**

If you want to create sharp-looking desktop presentations, *Show Partner F/X* offers high-powered scripting and animation modules but requires time and diligence. While *Storyboard Plus* isn't as powerful, it lets you crank out a snazzy show with much less effort.

SideKick Plus

Desktop utilities package

PROS: Multiple notepads; handy file manager, time planner, and outliner; expanded phone book; background communications; excellent manual

CONS: Requires a hard disk, expanded memory or RAM drive necessary for fastest performance

Borland's *SideKick Plus* is like a shopping mall: an environment with so many tempting goodies you have to guard your credit card. With this long-awaited upgrade, *SideKick* has gained an outliner and a first-class file manager, and the phone book, calendar, and calculator have been greatly expanded and improved. The program even supports low-end multitasking. *SideKick Plus* is still RAM resident, but it consumes about 1.5MB of disk space, needs a RAM disk or expanded memory to really fly, and at \$199.95 costs a lot more than the original.

SideKick Plus installs easily and requires a minimum of only 72K RAM, though a typical configuration will need about 150K. A menu displays changing memory use as you load different modules or swap them to expanded memory or a RAM disk for faster access. You can also remove *SideKick Plus* from memory, but only if it's the last resident application loaded.

Anyone familiar with *SideKick* will welcome *SideKick Plus*'s new File Manager, a disk manager that lets you copy and delete files, view text files, format disks, and perform other related functions. No more quitting *SideKick* to change directories or hunt for a file name. When you type *.* at a file name prompt in other modules, the File Manager pops up to help you locate it.

The second major addition is the flexible Outlook Outliner, which lets you attach a separate note window to any line; expand, contract, and rearrange sections in as many as nine windows; and print outlines with leading numbers or letters in various formats. Outlook also creates organization charts complete with boxes and connecting lines.

SideKick veterans accustomed to a single note file will appreciate the greatly enlarged Notepad module: Nine separate notepads are now available, each holding up to 54K of text. You'll never see another DOS prompt when shuttling between a to-do list, a telephone log, and research notes; just load them in *SideKick Plus* and switch between them at will.

In the Notepad editor, *WordStar*-like dot commands and control codes specify page breaks, headers and footers, and bold, italic, and underlined output; unfortunately, styled text doesn't appear as such on screen. For the time conscious, typing .LOG at the top of a notepad will automatically insert the date and time whenever this window comes into view.

To its legion of devotees, *SideKick*'s cardinal virtue has always been its skill at cutting and pasting text between applications; here again, *SideKick Plus* is a big improvement. The 4K Clipboard can now be edited, and you can cut and paste between applications without bringing up *SideKick Plus* itself.

As before, the PhoneBook is the repository for names, addresses, and related information; you can still dial numbers directly from the screen. The new PhoneBook's main advantage is faster searching. Its main drawback is its list of fixed data-entry forms. If you're a free-form kind of person, you may find this aspect of the upgrade painful: A utility will convert your old *SideKick* phone files to the new format, but only if you entered numbers in the standard configuration.

The PhoneBook has grown into a mini-telecommunications system that includes scripts for automatically logging on to such systems as MCI Mail, BIX, and CompuServe. For other services, you can write custom scripts and use a learning feature to teach the PhoneBook log-on sequences. Communications can run in the background, but this requires an extra 25K of memory.

Trying to organize your life? *SideKick*'s calendar has evolved into a Time Planner



FEATURES EVALUATION

SideKick Plus Bests Its Predecessor

The RAM-resident utility package is so crammed with goodies, it's become a full-service environment.

	1,000 SideKick Plus	1.56 SideKick	1.1 Metro
Standard features			
Price	\$199.95	\$85.95	\$85
Minimum RAM required	72K	64K	64K

File Manager

Complete DOS functions	●	n/a	●
Print functions	●	n/a	●
Shows/modifies attributes	●	n/a	○
Displays file statistics	●	n/a	●
Search function	●	n/a	○

Notepad

Maximum number of windows	9	1	△
Repeat last find	●	●	●
Search and replace	●	●	○
View files/directory	●	●	○ ¹
Automatic backup	●	○	○
Automatic save	●	○	○
Print formatting commands	●	○	○

Calculator types

Business/financial	●	●	●
Programmer	●	●	○
Statistical/scientific	●	○	○
Formula	●	○	○
Memory	●	●	●
Displays/prints tape	●	○	○

● Yes ○ No ◐ Deficient △ Unlimited

¹ Via File Manager.

Time planner

Displays calendar	●	●	●
Shows conflicts in appointments	●	○	●
Deletes appointments by category	●	○	○
Searches for free time automatically	●	○	○
Alarms	●	○	●
Repeating appointments	●	○	●

Outliner

Number of windows	9	n/a	1
To-do list	●	n/a	●
Attaches notes	●	n/a	●
Sort	●	n/a	●

Communications

Multiple phone books	●	●	n/a
RAM resident	●	●	n/a
Dials displayed number	●	●	n/a
Auto-log-on scripts	●	○	n/a
Script language	●	○	n/a
Background communications	●	○	n/a
Capture mode	●	○	n/a
Built-in text editor	●	○	n/a

Miscellaneous

Macros	○	○	●
Zoom windows	●	○	○
Editable clipboard	●	○	●
Swaps applications to disk	●	○	○

that displays daily, weekly, and monthly schedules. You can now search for blocks of free time in a busy appointment schedule and set alarms—even a snooze alarm—to get you to the church on time. *SideKick Plus* can link alarms to PhoneBook entries and automatically call remote services, perhaps to retrieve MCI Mail every day at a certain time.

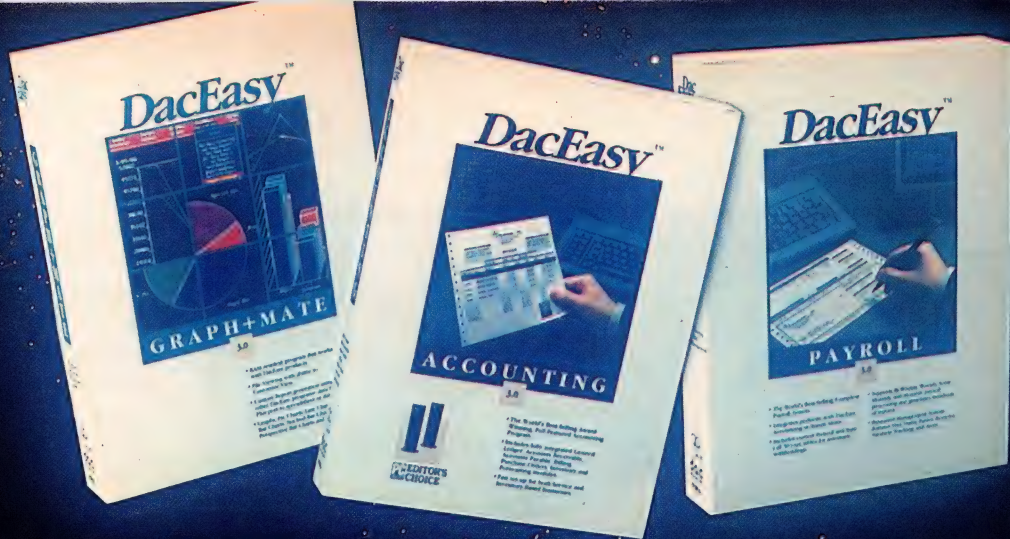
In a bit of numerical overkill, *SideKick Plus* adds scientific and formula calculators

to *SideKick*'s business and programmer calculators. They incorporate memory functions as well as an electronic tape—actually a special notepad that stores entries and calculations. You can save the tape to disk and print, edit, and modify calculations. Having this kind of record available makes the calculator much more practical for accounting jobs than the original tapeless version is.

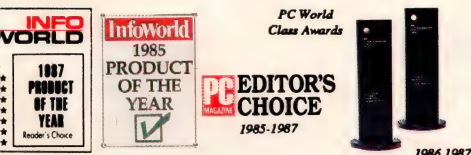
Although fully explained in the manual, *SideKick Plus*'s calculator entry style is somewhat unusual. To subtract 3 from 2, for

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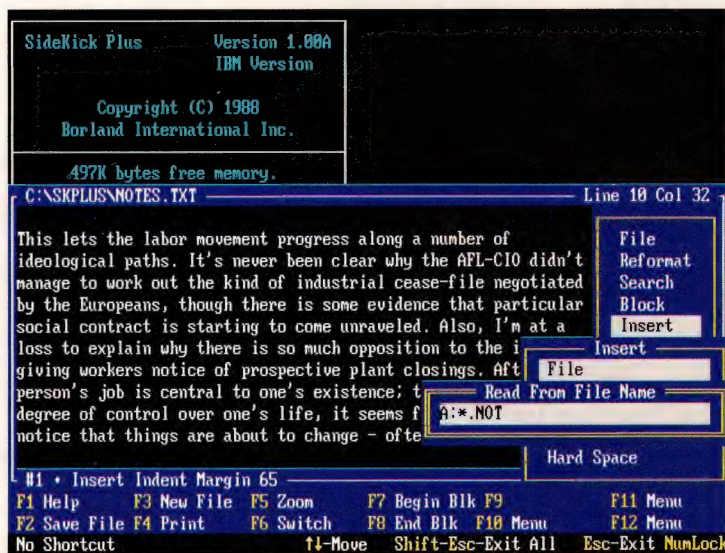
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When in
SideKick
Plus, typing ******
brings up the
new File
Manager.

example, you must type $2+3-\langle\text{Enter}\rangle$ instead of the more natural $2-3\langle\text{Enter}\rangle$. You get used to it, but it still feels like Reverse Slobovian Notation.

In addition to numeric calculations and conversions in hex, binary, and decimal values, the programming calculator now understands logical functions such as AND, OR, and XOR; this capacity is helpful for computing the result of a logical combination in a programming statement. The scientific calculator has statistical and trigonometric functions and understands exponential notation. Although the formula calculator is no substitute for a spreadsheet, it comes with several built-in financial formulas.

Well-designed menus, an intelligent keyboard layout, and excellent documentation make *SideKick Plus* an attractive package. Background communications, the Time Planner, and the Outlook Outliner rival stand-alone products, while the other features make *SideKick Plus* one of the most versatile software packages you can own. Finally, a new Module Manager will accommodate third-party applications, automatically bringing them up with the main menu. If and when those applications appear, *SideKick Plus* could move from a handy package of

desktop utilities to an operating environment with consistent commands and menus throughout. If you lack disk space or RAM, stick with the original program, which Borland will continue to support and sell. But if you want a multipurpose command post on your PC, *SideKick Plus* will put you in charge. —Tom Swan

WHERE TO BUY

SideKick Plus 1.00A

Borland Int'l
4585 Scotts Valley Dr.
Scotts Valley, CA 95066-9987
408/438-8400

List price: \$199.95, \$35 rebate to registered SideKick owners

Requirements: 384K, hard disk,
DOS 2.00 or later version
Not copy protected

Technical support: unlimited free
support, 408/438-5300, M-F 8-5

Other support: bimonthly newsletter,
user forums on CompuServe (Go Bo-
rapp), message service on MCI

**For more information, see Products
Featured in This Issue.**

Info-XL 1.0

Information manager

PROS: Allows cross-linking of text
data; good scheduling ability; fast, con-
venient search utility

CONS: Limited import and export ca-
pabilities, no exit to DOS, lacks auto-
dialer

For months, managers, researchers, and journalists have eagerly awaited the revolutionary information managers that would help them put their scattered project notes in order. Programs like Lotus's *Agenda*, Per-soft's *Ize*, and Symantec's *GrandView* promise to link or index unstructured bits of text—anything from quick notes and memos to corporate reports—into impromptu information bases without the constraints of traditional data base field formats.

While others waited for the revolution, Valor Software introduced *Info-XL*, an interesting personal planner that incorporates many of the linking and search features promised by its better-known competitors.

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Window Edit Change Print System 3/04/88 8:07:46p
Press [F2] to enter Command Menu. Ins

Manager - F3

Wine Marker's Equipment	-
Marvin's Gardens	-
Bottles R Us	-
Agricultural Chemicals	-
Abbott	-

Records - F4

Mailing Name	Abbott Laboratories
Phone	209 555-1212
Address Line 1	1540 N Main
City	Fresno
State	CA

Comments - F5

Supply anti-fungal medications.

Daily Schedule - F6

Friday March 4, 1988

Monthly Calendar - F7

March	1988
	1 2 3 4 5
6	7 8 9 10 11 12
13	14 15 16 17 18 19
20	21 22 23 24 25 26
27	28 29 30 31

The main functions Info-XL performs are reflected in its five primary windows: the Manager, Records, Comments, Daily Schedule, and Calendar windows. A sixth, the Search window, pops up when you need to locate a piece of information.

The program isn't cheap, in dollars (\$295) or in RAM (384K minimum), nor is it memory resident. But *Info-XL*, which stands for information excellence, is a useful tool designed to let you input bits of information about people and projects quickly—and find them when you need to.

Each of *Info-XL*'s active windows has special functions and requirements, and navigating them takes some getting used to. The Manager is home base for the entire program and works much like an outliner. This is where you list all the contacts, projects, and other information you want to track, grouped by headings and subheadings. The Records window accepts information organized into fields, which makes reporting easy later on. The Comments window is a miniature word processor that accepts as much as 7K of text per entry. The Calendar, Daily Schedule, and pop-up Search windows round out the set.

What makes *Info-XL* special is that unlike an integrated package that merely lets you move data between modules, the program offers bona fide interconnection. Suppose your to-do list in the Manager includes a meeting with landscape designer Jeff Gillman on September 4. If you highlight the meeting heading, you'll see the date noted on your daily schedule, Gillman's address and phone number in Records, and perhaps a few notes

about landscaping in the Comments window. Now suppose Gillman is also a member of a committee you head. With a few keystrokes you can create a link that will bring up the same data when you go to the committee heading. The data is entered once but can be referenced from many different places.

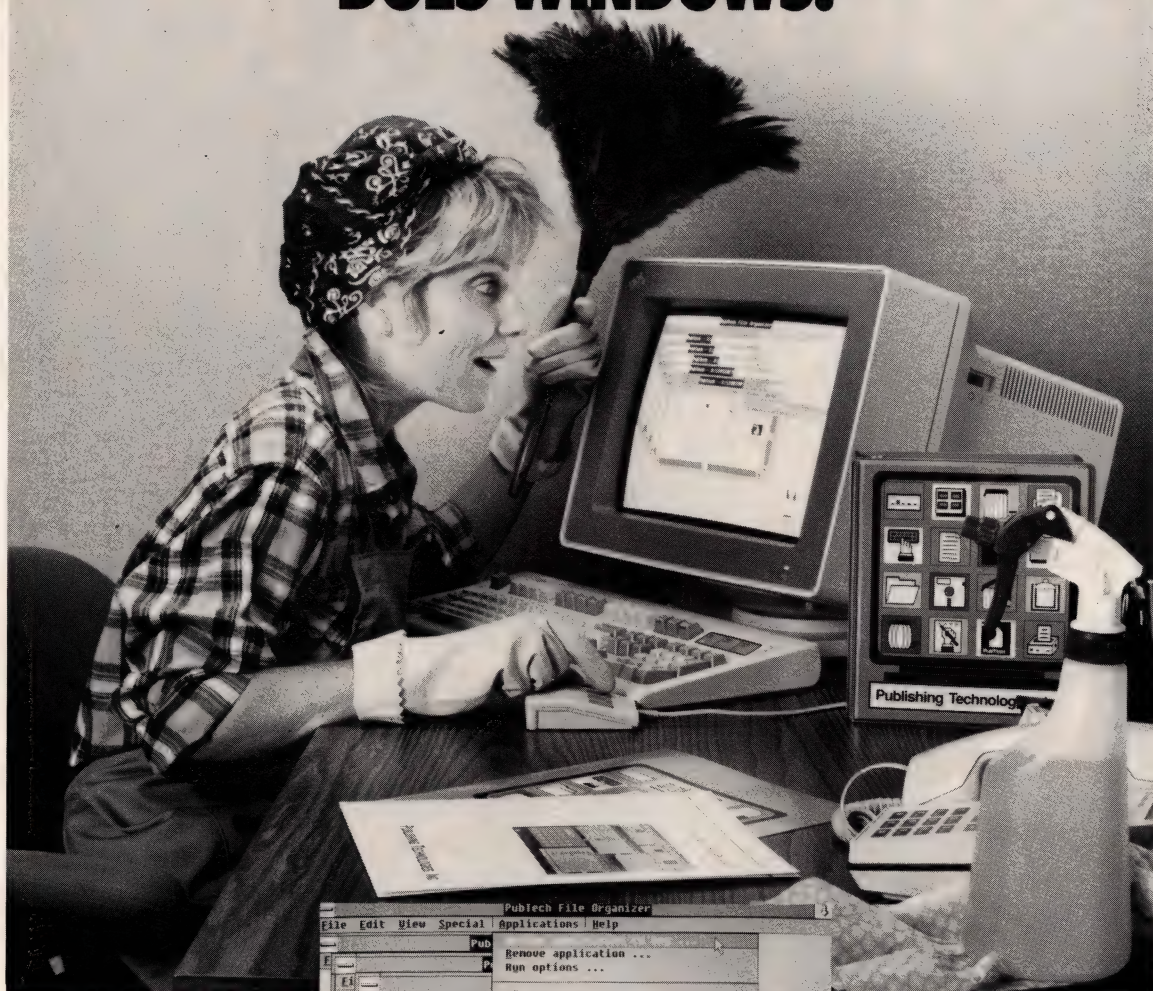
Putting data into *Info-XL* by creating headers in the Manager is a bit tedious, but finding it later is a cinch. The program's speedy search utility uses a "fuzzy" matching technique that avoids the restrictive parameters of Boolean-type AND/OR searches. *Info-XL* accepts combinations of words—even misspelled ones—and finds the closest matches. The program will retrieve matches and their related headings in the Manager window and automatically display any related Records and Comments data.

Although the idea behind *Info-XL* is admirable, the program itself has a number of annoying shortcomings. You can import text in ASCII or *WordStar* format only, and all imported files must be run through the Comments window, whose 7K limit can suddenly seem rather confining. Given *Info-XL*'s emphasis on flexibility, it should let you enter items directly into the Daily Schedule; as it is, everything that goes into the schedule has to be tied to a heading in the Manager. *Info-XL* excels at displaying information on screen, but it exports data only in comma-delimited format.

Other flaws, at least, are fixable. The program lacks a phone dialer, for example, but works well with General Information's *Hotline*. And although *Info-XL* isn't RAM resident, Valor claims it can be used concurrently with other applications in Quarterdeck's *Desqview*.

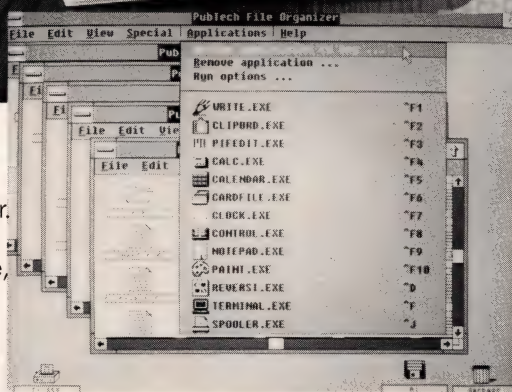
Info-XL is the kind of product some people will rave about while others will shrug their shoulders. It takes time to master, and if you've survived so far with a Rolodex and a desktop calendar, it probably isn't worth

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Patrick Marshall

WHERE TO BUY

Info-XL 1.0

Valor Software
20005 Hamilton Ave.
San Jose, CA 95125
800/648-2567, 408/978-3044

List price: \$295

Requirements: 384K, DOS 2.00 or later version

Not copy protected

Technical support: unlimited free support, toll-free number, M-F 8-6

Other support: 30-day money-back guarantee, training available

For more information, see Products Featured in This Issue.

Turbo Pascal 4.0

Pascal compiler



PROS: Extremely fast, easy to use, generates compact .EXE files that overcome the former 64K limit, excellent graphics support

CONS: Linker is not compatible with Microsoft .OBJ format

Turbo Pascal has finally come of age. Version 4.0 features a true linker, better ties to DOS, excellent graphics support, and performance that rivals that of the best C compilers. Its linker isn't compatible with Microsoft .OBJ format, however, and programmers must await the next upgrade for an integrated debugger.

When Turbo Pascal came out in 1983, it revolutionized the way programmers worked.

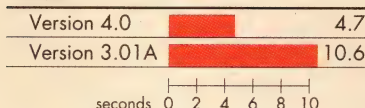
NSTL TEST REPORT

Turbo Pascal

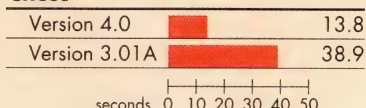
Version 4.0 cuts Turbo Pascal's compilation time in half, but the resulting .EXE programs run no faster than those created with version 3.0.

Compilation

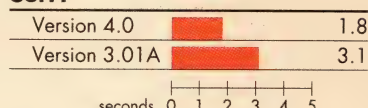
Btree



Chess

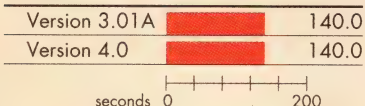


Sort1

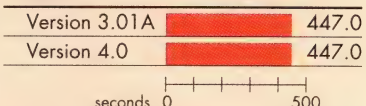


Execution

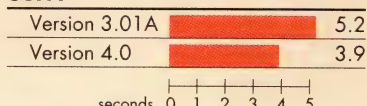
Btree



Chess



Sort1



Benchmarks were performed on an 8-MHz IBM AT Model 339 with a 30MB hard disk and a monochrome video adapter. Three programs, Btree and Sort1 from the Turbo Pascal 3.01 Database toolbox and Chess from the 3.0 Game-works toolbox, were used to compare 3.0 to 4.0. Because Turbo Pascal 4.0 uses different syntax from version 3.0, the Upgrade program provided with 4.0 was used to convert the test programs for use with 4.0.

The Btree benchmark sent all 1000 records of randomly generated data—indexed by customer

code and customer name—to a null printer (a device that simulates an infinitely fast printer, one not slowed by paper or printhead movement). The Sort1 benchmark read from disk the sample customer file provided with the Database toolbox, sorted the data in memory, and then displayed the records on the screen. Almost all the difference in execution speeds is due to the difference in screen updating routines of 3.0 versus 4.0. The Chess benchmark timed how long the program took to respond to a particular move in a specific situation, with the program's "performance level" set to five.

Compilation

The compilation benchmarks compared the time each version took to compile the test programs' ASCII source code files into .EXEs.

Execution

The execution benchmarks compared the execution speeds of 3.0-compiled .EXEs versus 4.0-compiled .EXEs.

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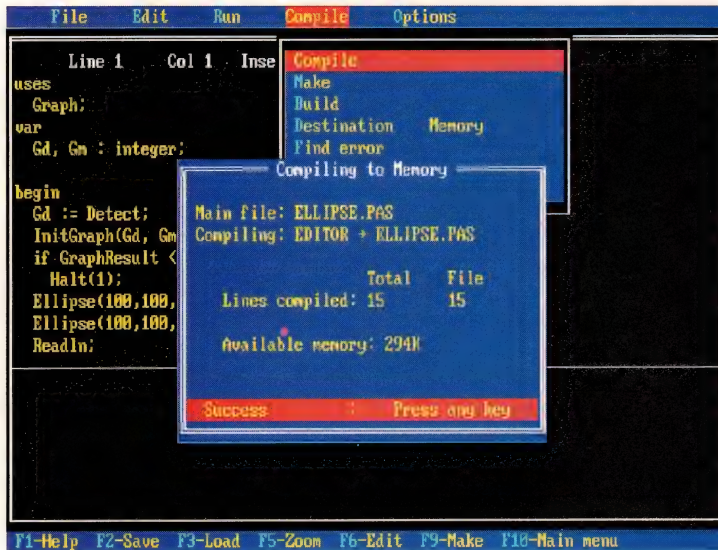
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Turbo Pascal 4.0's user interface presents a dramatic improvement over previous versions. You can edit in 43- or 50-line mode on the EGA or VGA, respectively, and windows can be zoomed to fill the whole screen.

Where they once had to edit and recompile programs endlessly, they could now compile them in seconds and quickly locate errors with a full-screen editor. But Turbo Pascal versions 1.0 through 3.0 generated CP/M-like .COM files with a 64K limit on the size of the executable code (unless you used overlays) and offered no easy way to maintain libraries of precompiled subroutines. Version 4.0 now produces .EXE files and overcomes the 64K size limit. Programs compile about 50 percent faster than they did before, though they run no faster than under 3.0.

The biggest improvement in version 4.0 is the addition of a true linker. Previous versions incorporated the entire 10K run-time library into every compiled program; version 4.0 brings in only the library routines that are actually needed. So the run-time library can be much larger than before, and users can add to it themselves.

Turbo Pascal even has a C-like "make" utility to manage compilation of multiple source files, and it supports conditional compilation of sections of code based on directives given at the beginning. Linker maps can be used with *Periscope* and similar symbolic debuggers (but not *Codeview*) and can be printed out as text files like those produced by the Microsoft linker.

Turbo Pascal 4.0's real forte, however, is graphics. The supported devices include the IBM CGA, EGA, VGA, MCGA, and 3270 PC; the Hercules Graphics Card; and the AT&T 6300 card. An impressive array of built-in routines makes possible not only lines and circles but bar and pie charts, pattern-filled polygons, and lettering in a variety of fonts.

Turbo Pascal has changed in other ways, too. The language has moved closer to ISO Standard Pascal, the user interface has been revamped, and Turbo Pascal is more at home with DOS than it was before. A procedure to run DOS subtasks, like *SHELL* in BASIC, is now built in. If your program does not use the screen control package, screen I/O is handled through DOS and is therefore redirectable.

Pascal is an orderly language, simpler than BASIC and thus ideal for beginning programmers, but, like C, it also lets you design your own data structures for professional-level programming. Turbo Pascal has always been a good compiler; now it's an excellent one. —*Michael Covington*

WHERE TO BUY

Turbo Pascal 4.0

Borland Int'l
4585 Scotts Valley Dr.
Scotts Valley, CA 95066
800/543-7543

List price: \$99.95

Requirements: 384K (256K for command-line version), DOS 2.00 or later version

Not copy protected

Technical support: unlimited phone support, no toll-free number, M-F 8-5

Other support services: forums on CompuServe (Go BPROGA) and BIX (Borland conference), bimonthly magazine free to registered owners

For more information, see Products Featured in This Issue.

386 SYSTEMS

Is it time to buy? Which one is best?

Here's how to find out.

It's the future of personal computing. For power and speed, 386 PCs outclass all other machines.

For large spreadsheets and databases, the 386's dramatically faster performance is ideal. And for emerging applications like networking, desktop publishing, CAD, statistical analysis, expert systems and real-time animation, the 386 is *essential*!

You can expect to see an increasing number of programs that run efficiently *only* on a 386 system. To maximize the multitasking capabilities of OS/2, its tremendous processing power is a must.

But should you buy *now* — or *wait* for still further improvements? Which system is best — and what specific configuration suits your needs?

The choices are many — and potentially confusing. There are 16MHz, 20MHz and now 25MHz 386 machines. Huge differences in performance. Exaggerated promises by vendors. *Among the variables you must consider:* OS/2 capabilities, disk and memory caching, clock speeds, display adapters, real and protected modes, compatibility, expandability...and more.

New report has the answers.

Now there's a solution. *PC Digest's* authoritative, comprehensive report on 386 systems. It's just off the press. With concrete recommendations based on objective laboratory tests. Including the first OS/2 multitasking tests for the 386. And an exclusive preview of IBM's 70 series and Compaq's 25MHz PC.

We tested 19 machines, including the ALR FlexCache 386, AST Premium 386/20, Compaq Deskpro 16 and 20, Dell 310, Everex 20 and IBM's PS/2 70's and 80's.

Our technicians evaluated each machine for ease of installation and handling, applications-based performance, features, documentation, and software incompatibilities.

In *PC Digest's* new 386 report, you'll find an in-depth tutorial covering 386 technology (including memory caching, memory architecture and numeric co-processors)....Detailed writeups on each machine.... Performance test results....

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Some of the results.

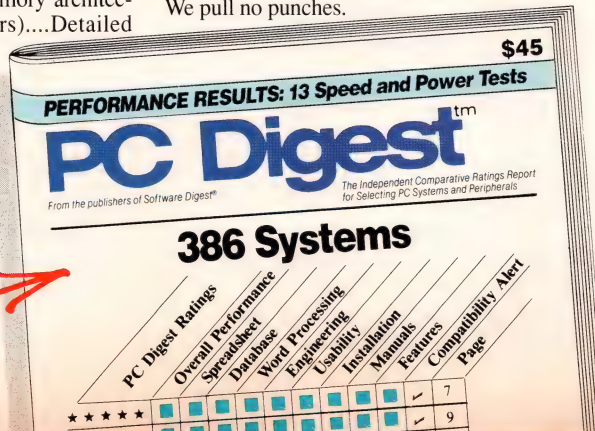
Our tests uncovered some revealing conclusions:

- The outstanding across-the-board performance of two machines won them *PC Digest's* coveted Five Stars — our highest rating.
- IBM's PS/2 Model 80 20MHz model was beaten by most of the other 20MHz systems tested.
- In the 20MHz systems, memory caching is essential to high-level performance.
- One 16MHz machine runs DOS applications acceptably, but functions *terribly* under OS/2.
- Avoid the machine that rated *dead last* — its performance in *every* category was well below average.

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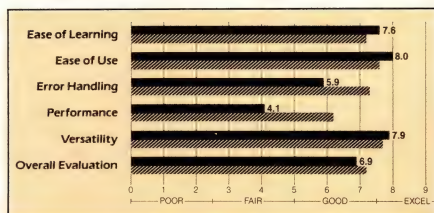
— Richard Landry, Editor, *PC World*

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Side-by-side bar charts show how programs score on 5 key test criteria.



Each program is subjected to an exhaustive series of "hands-on" tests by typical computer users at all experience levels.

software. It combines technical testing with practical, "hands-on" sessions involving typical users at all experience levels.

Under these controlled conditions, we scrutinize each program, and compare all of them head-to-head. Each is tested not just once, but *many times*, under strict rules that ensure consistency and objectivity.

A systematic series of tests measures *ease of learning, ease of use, error handling, versatility, performance* and more.

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✓Desktop publishing ✓Integrated programs
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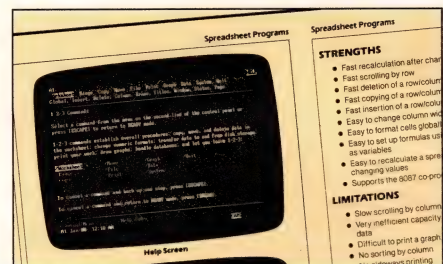
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— L.J. Callaghan, Nabisco, Hanover, N.J.

Right now, a new generation of software is evolving. New programs — and changes to existing programs — will appear at an accelerating pace. OS/2 will soon be baseline technology — and generate a host of new applications. The 386 machines will accelerate the proliferation of software choices.

Today, with DP budgets tighter, with the new emphasis on documenting computer productivity and bottom-line payoff, you'll be required to *justify* your purchasing decisions more than ever before.

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DATA ENTRY FORMS										
Maximum forms per table	U	1	A96	U	U	U	A80	U	10	U
Maximum screens per form	2	16	15	Y	A42	15	15	1	5	15
User specified field placement	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Text placed anywhere on screen	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
VALIDATION										
Lookup validation	✓	✓	✓	P	✓	✓	✓	✓	P	✓
Lookup in another table	✓	✓	✓	P	✓	✓	✓	✓	P	✓
Range checking	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Validate by mathematical expression	✓	✓	✓	P	✓	✓	✓	✓	P	✓
Date checking	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Time checking	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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Software Digest Rating	Overall Evaluation	Program Name	Version Tested	Ease of Learning	Ease of Use	Error Handling	Performance	Verifiability	Memory Requirement	Price	Supports 8088 Chip	Program Can Be Copied	Demo Disk Available
****	8.0	O&A	pre-3.0 2.0	✓	✓	✓	✓	✓	512K	\$349	✓	✓	✓
***	7.7	PFS:Professional File	1.01	✓	✓	✓	✓	✓	256K	\$249	✓	✓	✓
***	7.2	PowerBase	2.3	✓	✓	✓	✓	✓	384K	\$349	✓	✓	✓
**	6.4	RapidFile	1.0	✓	✓	✓	✓	✓	256K	\$295	✓	✓	✓
**	6.2	Nutshell Plus	1.0	✓	✓	✓	✓	✓	256K	\$295	✓	✓	✓

Master Ratings Chart on each issue's front cover compares every program at a glance.

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Show Partner F/X 3.0

Presentation graphics package

PROS: Powerful scripting and animation modules

CONS: Hard to learn, limited paint capabilities

IBM Storyboard Plus 1.0

Presentation graphics package

PROS: Easy to learn and use; excellent font, graphing, and image library features

CONS: Limited to short, simple scripts; weak on animation

Storyboard Plus's script editor is a marvel of clarity. You select commands from a drop-down menu and preview the show in the window at lower right.

Any teacher knows how effectively a show-and-tell session can get a message across. You can do the same thing with a desktop presentation—a disk-based graphics show displayed on your monitor. With either of two recently revamped software packages, Brightbill-Roberts' *Show Partner F/X 3.0* and IBM's own *Storyboard Plus*, you can put a sales pitch, tutorial, or interactive training session on your audience's desk, and let your pictures do the talking.

Of the two programs, *Show Partner F/X* is the more technically demanding, but its

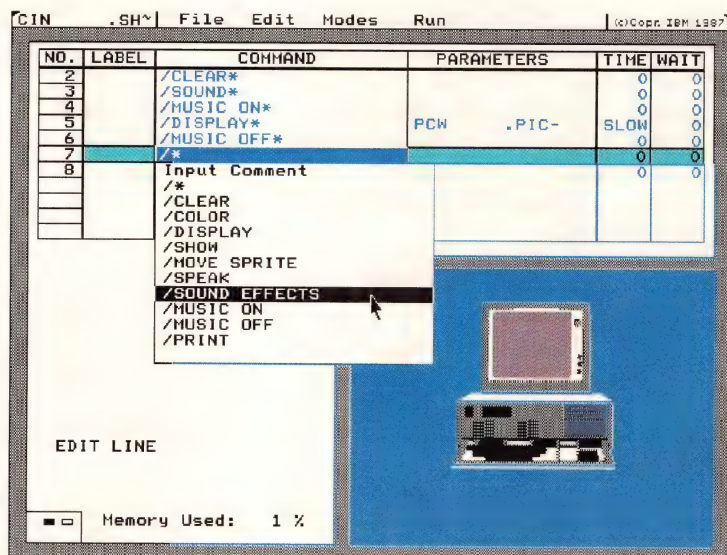
powerful scripting and sophisticated animation produce spectacular results. *Storyboard Plus* is easier to learn and use, excels at creating graphs and scripts, and features an exceptional paint module. Both programs cost \$350, require a minimum of 320K, and install easily. You can run them from the keyboard, but a mouse is recommended—especially for the programs' paint modules.

The first step in creating a presentation is to create a series of screens—or grab them from other applications with the programs' memory-resident screen-capture utilities. *Show Partner F/X* and *Storyboard Plus* store images in a bin of successively numbered files; the images are retrieved later with the paint or script modules. *Show Partner F/X* has a second module to capture images created in the *Microsoft Windows* environment.

Next, you modify captured screens—or create new ones—using the programs' paint modules. These modules allow you to draw, paint, copy, move, mirror, or scale images. You can also design custom colors or patterns, add text, or even scissor out portions of other images.

Show Partner F/X's paint module is clumsy, and its menus are awkwardly designed: Changing brush size and color requires eight separate keystrokes, for instance, as opposed to just three with *Storyboard Plus*. *Show Partner F/X* includes few graphing capabilities but makes amends by incorporating a dandy font editor. The program includes two disks of clip-art images; more can be downloaded from the company's bulletin board.

Compared to its rival, *Storyboard Plus* has an excellent paint module; it resembles *PC Paintbrush* or *GEM Paint*, with a familiar color palette, icon tools, and pulldown menu bar. Loading and saving files is a snap, and you can display and manipulate up to eight font styles before placing them on the screen. A basic graphing utility creates four varieties of graphs from scratch, and the program comes with six image libraries that incorporate hundreds of clip-art images.



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PC Magazine, 12/8/87**

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"... run, don't walk ... and place your order ..."

PC Week, 11/11/86

Form Letters

December 17, 1988

Mr. Edward T. Rustin
Controller
Amex Industries, Inc.
54 East Mason Boulevard
Easton, IN 54007

Dear Mr. Rustin:

Our records show that your account has a balance that is more than 30 days past due. Here is a complete list of your unpaid invoices as they appear in our records:

Invoice No.	PO No.	Invoice Date	Unpaid Balance	Days Past Due
			\$1,365.97	115
			\$763.83	94
			\$2,367.09	35

			\$4,496.89	

please call me immediately, of \$4,496.89 not later than

Very truly yours,

J. Russell Harrison

J. Russell Harrison
Credit & Collections

DESIGNER Gifts, Inc.

Invoice Date: June 12, 1988
Order Number: 32212
Date of Order: 10-Jun-88
Ship Via: U.P.S.
Payment Terms: Net 30

Invoices

Ship to:
Holly Lane
18 Cambridge Avenue
Hazardville, CT 06082

Item	Description	Quantity	Unit Price	Amount
904	Silk Screened Pottery Mug	24	4.95	\$118.80

			25.00	\$300.00
			18.00	\$108.00

Subtotal

\$526.80

Volume Discount (26.34)
cut Tax at 7.5% 37.53
ng and Handling 5.27

TOTAL \$543.28

Statements

Software & Services, Inc.
1328 Canterbury Avenue
Westheights, IL 60072

DATE	ACCT. NO.	SUM.
31-JUL-88	3091	

DATE	TYPE	REF. NO.	STORE NO.	CHARGES	CREDITS	BALANCE
07/01/88						\$287.56
07/06/88	6	33791		311.24		598.80
					110.00	488.80
					177.56	719.93
						542.37
						1,490.10

0 DAYS	30-60 DAYS	CURRENT
0.00	0.00	1,490.10
PAY THIS AMOUNT		\$1,490.10

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Supervisors
555 June 1988 555

Plant Manager Jack Rogers	
Sally Anderson	Mary Ellison
Fred Lancaster	

Experiment Head
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18 Lyman Street, PO Box 4063, Westboro, MA 01581

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Circle 181 on reader service card

Show Partner F/X Script Editor Version 3.2									
Picture	Comment	Loc#	Effect	Dir	Location	Size	Target	Speed	Time
Learning FXSED	Comment								
Tutorial Script	Comment								
WELCOME.GX1	Replace		Up		Full Picture	Same	Fast	20	Key
	Weave				40,0	247,27	36,0	Fast	
MEMFILE EFFECT	Comment								
=====	Comment								
Load GX1s into RAM	Comment								
TXT*.GX1	MemFile				Full Picture	Same	Fast	0	
Introduction Screens	Comment								
=====	Comment								
INTRO waits for a	Comment								
key, then a MENU	Comment								
is displayed	Comment								
TXTINTRO.GX1	Box	In			Full Picture	Same	Fast	Key	
clear	Box	Out			Full Picture	Same	Fast	0	
TXTINTR1.GX1	Box	In			Full Picture	Same	Fast	Key	
clear	Box	Out			Full Picture	Same	Fast	0	
TXTINTR2.GX1	Box	In			Full Picture	Same	Fast	Key	
Script: LEARN.PRO									
Current Row:4 of:33 Current Directory: C:\EX\SAMPLE									

Show Partner
F/X has so many
scripting op-
tions, its screen
looks like a
1-2-3 tax
template.

Once created, the screens are assembled in a script. Both programs' scripting modules appear as spreadsheets. Screens are listed in rows; commands that determine how they appear on screen are stored in columns. *Show Partner F/X* really flexes its muscles here, offering more than a dozen transitions and a staggering number of display options. *Storyboard Plus's* script program is simpler but offers far fewer options. Both programs let you preview the results of your handiwork.

Nothing adds sparkle to a desktop presentation like moving images and animation. With *Show Partner F/X* you can create individual objects in a separate animation module, save them as a series of frames, and then recall them by means of the script. You can herd nine animated objects at once, each with its own predetermined path and rate of movement. *Storyboard Plus's* animation features are much more modest. You can animate and choreograph multiple objects, but their number is limited by system memory. Both programs let you add sound effects to the final show.

Show Partner F/X and *Storyboard Plus* can both create dazzling desktop presentations, but they are aimed at distinctly different audiences. If you want advanced scripting and animation, buy *Show Partner F/X*. Otherwise, *Storyboard Plus* is much easier to use, and its superior paint module can help make your message shine. —Paul Meyers

WHERE TO BUY

Show Partner F/X 3.0

Brightbill-Roberts
120 E. Washington St. #421
Syracuse, NY 13202
315/474-3400

List price: \$350

Requirements: 320K (640K recommended for VGA), two disk drives, DOS 2.00 or later version
Not copy protected

Technical support: free unlimited phone support, no toll-free number, M-F 9-5

Other support: 30-day money-back guarantee, training available

For more information, see Products Featured in This Issue.

WHERE TO BUY

IBM Storyboard Plus 1.0

IBM
Information Systems Group
Dept. CCB
900 King St.
Rye Brook, NY 10573
800/IBM-2266

List price: \$350

Requirements: 320K, two disk drives, DOS 2.00 or later version
Not copy protected

Technical support: 90 days free support (including defect reporting by mail or phone), M-F 10-6, free upgrade for registered users, extended support \$395 per year or \$75 per incident, toll-free number

Other support: quarterly IBM software newsletter

For more information, see Products Featured in This Issue.

Michael Covington is a researcher with the Advanced Computational Methods Center at the University of Georgia in Athens, Georgia, and a coauthor of Prolog Programming in Depth (Scott, Foresman, Glenview, Illinois, 1988). Patrick Marshall edits the Commentary Page of the Oakland Tribune. Paul Meyers is a San Francisco-based video producer and freelance writer specializing in science and technology. Tom Swan is the author of Mastering Turbo Pascal 4.0 (Howard Sams, Indianapolis, 1988) and is PC World's Star-Dot-Star editor. ●

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CORPORATION

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Prices and terms subject to change without notice. Trade-up rebate offer expires June 30, 1988. FormWorx and Fill & File are trademarks of FormWorx Corporation. dBase III Plus is a trademark of Ashton-Tate.

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Signature _____

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Title _____

Company _____

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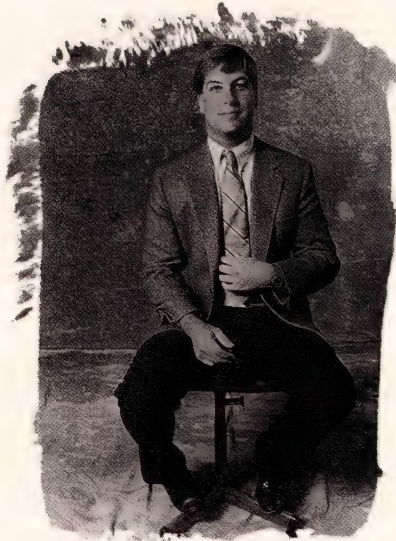
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AND FOR THE AUTHORS

SHAREWARE COMES OF AGE

JUDY GETTS



MARSHALL MAGEE

"MR. IMAGE"

Many students work their way through college by busing tables. Justin Boyan found something a little more lucrative. In the past year his *Boyan D3* communications software, a shareware program he started hacking out at the tender age of 15, grossed \$30,000. The 18-year-old University of Chicago sophomore is inexplicably cool about success; talk to him and you'll think all shareware authors find their way to riches.

Bruce Barkelew started writing *ProComm* as a programming exercise and was eventually joined by fellow computer-science student Tom Smith. Two and a half years after they uploaded their communications program to on-line services and bulletin boards (BBS's), they were grossing a half million dollars a quarter. "Even in our fantasies, we never imagined it would take off like this," says Smith.

For developers like these, shareware represents neither a last resort for packages that the big publishers won't touch nor an act of altruism. Rather, shareware is their preferred form of marketing and distribution. "Try to imagine a business in which you get daily, enthusiastic reinforcement from people you've never met, and where you get checks in the mail with little or no capital outlay," says Jerry Medlin, author of *Jerry Medlin's Accounting Series*.

Andrew Fluegelman, a pioneer in sending software out the door with a request to send money if satisfied, called it "an experiment in economics." The experiment was a success, and Fluegelman soon hired people to han-

dle the checks that flooded into his office in payment for his *PC-Talk* communications program. Since then, programmers and users alike have embraced the pay-if-you-like-it concept as a way to avoid traditional marketing and distribution costs and to bestow ample profits on authors and bargains on users.

Shareware is not free, and its authors bristle if you call it public-domain software. They give users permission to copy and try their programs without charge. But they retain their copyrights and expect those who continue using the software to pay them. In contrast, authors of public-domain programs forfeit all rights.

In the past, image problems have battered shareware's commercial credibility. To some, *shareware* still connotes ragtag software written by hobbyists who don't answer support calls and who move without leaving a forwarding address. "The hardest thing about being a shareware author is convincing people that you're actually in business," remarks Marshall Magee, whose *Automenu* menuing system has spawned a company with ten employees.



BOB WALLACE

SELLING THE POPULAR PC WRITE,
QUICKSOFT HAS GROWN
TO EMPLOY MORE THAN 25.

The Corporate Share

Shareware packages are becoming more polished, and their authors are growing increasingly adept at operating in Fortune 500 territory. Magee goes to great lengths to present a blue-suit-and-power-tie image and sells a shrink-wrapped version of *Automenu* with printed documentation and a box embossed with the Magee Enterprises logo. "Other shareware authors dub me Mr. Image," he laughs.

"In the past, shareware has been perceived as a mom-and-pop product," says Les-

lie Fiering, manager of advanced technology at Banker's Trust in New York City. "I don't think that's true anymore." Fiering, a member of the executive board of the Microcomputer Managers Association, believes that the longevity of some shareware houses has helped to brighten the corporate view.

Most well-known shareware authors get more than half their receipts from corporations. John Friel III sold more than 600 site licenses for his *Qmodem SST* communications program, including one to Disneyland. "Even Mickey Mouse is a *Qmodem* user," quips Friel. *Qmodem*'s closest competitor, *ProComm*, is licensed even more extensively.

Nevertheless, corporate purchasing orders come hard for shareware, Fiering says. Products are unlikely to sneak in the door unless a corporate PC enthusiast picks a package off a BBS. And many corporate information managers feel that dialing into a BBS is a demeaning experience, says Cheryl Currid, manager of sales systems, planning, and information for Coca Cola Foods in Houston, Texas.

On a darker note, some businesses still fear that shareware companies will sue if some users fail to register. "But that's just preposterous," says Currid.

Ironically, shareware has growing appeal for corporations precisely because of the flexibility its authors show in negotiating licenses. Walter Kennamer, a senior manager in the national computer audit group at Ernst & Whinney, emphasizes that allure. "With 6000 PCs, it's very important for us to avoid the administrative hassles of keeping track of individual software packages," explains Kennamer. "We've had very good luck negotiating with shareware authors for site licenses."

Among shareware's added attractions is personal attention from its developers. If Currid feels that a key feature or two is missing, she says, she'll call the author directly and ask for an enhancement. When possible, authors are usually glad to make the effort.

COMPETITIVE COMMUNICATIONS

They are the most intense of rivals and the best of friends. When *ProComm*'s Tom Smith and Bruce Barkelew get together at trade shows with *Qmodem*'s John Friel III, they buy each other beers and swap jokes about error-checking protocols. "There's no real competition, except in selling orders faster," says Friel.

Datastorm Technology's Procomm has charged way ahead, with 50,000 registered users, says Smith. The Forbin Project's *Qmodem SST* runs second, with more than 7500 registered users. Both also claim impressive lists of site licenses.

From their *PC-Talk*-inspired user interfaces to their sharp color graphics, the two programs look like twins. Both offer long lines of error-correcting protocols and are blindingly fast. They even share a haunting likeness in their bells and whistles. *ProComm* has leapt ahead partly because "we had terminal emulation first," says Smith, "and that made us more appealing to large corporations." *ProComm* also touts a less cluttered user interface.

In 1986 when Barkelew and Smith started *Datastorm*, *ProComm* was

already circulating on bulletin boards. It was far from pulling in princely sums. But *Datastorm* now has 18 full-time employees, with a full-time technical support staff and 4 other workers who do nothing but process the 4000 orders received monthly.

In contrast, Friel works solo from his home in Iowa, with his wife and sister lending a hand. His main sources of advertising and distribution are the five networked bulletin boards that he runs from his home and a roundtable on General Electric's *GEnie*. He is notoriously difficult to contact.

Until two and a half years ago, when he began to get more money in the mail than in his paycheck, Friel worked as a systems programmer/analyst for John Deere in Waterloo, Iowa. His commercial expectations are decidedly laid back. If users fail to send in a \$30 registration fee, he shrugs it off. He wrote the software, he says, for the technical challenge and the personal enjoyment. —J. G.

Weekend Warriors

The most prosperous shareware publishers follow a definite pattern. Their products start as weekend programming projects and slowly evolve into a cottage venture. Then, almost overnight, the venture blossoms into a full-scale business with full-time employees and office suites.

Bob Wallace, who is credited with coining the term *shareware*, is probably the best-known shareware entrepreneur. In 1983 Wallace left his job as one of Microsoft's first staff programmers, started Quicksort with \$10,000, and wrote *PC-Write*; soon afterward he hired his first employee. The following year he grossed \$380,000. *PC-Write* now tallies more than 30,000 registered users and 77,000 purchasers of a user certificate, which gives the right to use the program; the company itself has more than 25 employees. "Shareware's great," Wallace says simply.

Jim Button was an IBM systems engineer when he wrote *PC-File* in 1982. "When I posted a shareware notice on it," he says, "my wife told me, 'You really are a crazy old man if you think anyone is going to pay you a penny voluntarily for that program.'" Within weeks, however, registrations were piling up so fast that Button had to rent a bigger mailbox. His ButtonWare firm now boasts a staff of 20 and eight products, and over 1000 dealers carry the packages. But Button still relies on shareware channels as his primary outlet.

Magee created *Automenu* while working his way through college as a programmer and consultant. After watching a client's secretary struggle with DOS, Magee wrote a simple menuing program. Then he uploaded the software to an Alabama BBS, and \$20 user registrations started trickling in. The first year he made nothing, the second only \$200, the third \$15,000, and the fourth \$175,000. Last year Magee's sales topped \$750,000.

But for every such prominent success story, there are at least a dozen stay-at-home shareware authors, some of them also quite successful (see "Buyers' Guide: Best of Shareware" in this issue). That's the case with Ward Mundy, author of the *dBASE III* clone *WAMPUM* (for *Ward's Automated Menu Package Using Microcomputers*). Di-

rector of information systems for the U.S. Court of Appeals in Atlanta and a PC consultant, Mundy wrote *WAMPUM* for private clients who lacked the expertise to write in *dBASE*. Today, between 40 and 100 \$25 registrations arrive at his home daily. "My



WARD MUNDY

WAMPUM, A \$25 dBASE III CLONE,
HAS TURNED INTO A
PROFITABLE HOME BUSINESS.

2-year-old and 3-year-old lick the stamps," he says. "My wife answers the phone—much to her chagrin."

Phil Katz wrote *PKARC* one weekend "because it was something to do." Circulating on BBS's for just two years, the \$20 data compression package boasts over 2500 registered users and a sizable roster of site licensees. Katz did all the tech support and public relations himself via bulletin board until last year, when he hired his sister and a part-time employee and enlisted his mother



JERRY MEDLIN

DESPITE SCARES,
BULLETIN-BOARD VIRUSES ALMOST NEVER
THREATEN SHAREWARE USERS.

as a corporate officer. Katz recently quit his full-time job as a software engineer.

Four years ago a software publisher asked Marc Adler to write a UNIX word processor. When the publisher did a poor job of marketing it, Adler reclaimed his stake, ported the software over to the PC, and renamed it *New York Word*. Now, he says, the \$40 package claims 1200 registered users plus a few site licensees. "Only 1 to 5 percent of the people who use it ever pay," Adler estimates. "But the encouraging letters from people using your program make it all worthwhile."

Jerry Medlin got his start nine years ago writing accounting software for the Radio Shack Model 1. Now the Napa, California, accountant distributes as shareware four \$35 small-business accounting programs that bear his name: *Jerry Medlin's General Ledger*, *Accounts Receivable*, *Payroll Writing*, and *Accounts Payable*. The accounting series garners about 200 new users per month. "I suppose there are people out there who are using the program and not paying," Medlin says, "but we try not to think about them."

Taking Stock of Shares

Beginning with all the users who never pony up, shareware has its share of woes. Many magazines balk at reviewing such packages. Some mail-order vendors bundle the software with public-domain packages and hawk them with claims such as, "100 free programs for \$10." A few authors have even seen their programs bootlegged—sent out with someone else's "pay me" request.

Nor are all shareware products born equal. "The upper echelon of shareware programs is certainly on a par with commercial software," says Kennamey. "But there are more and more of those programs that someone whipped out over a weekend."

Then there are scares about Trojan horse and virus programs. A *Trojan horse* conceals a potentially malevolent program that remains hidden and dormant until some condition or time, such as April 1st or Friday the 13th, triggers it. The invading program is often a *virus*, a program that can reproduce and secretly attach a copy of itself to other files. The virus then spreads to other systems when infected files (new Trojans) are

later innocently downloaded or copied.

Katz was hit hard earlier this year by a Trojan—a reputed bug fix for *PKARC* that would turn a healthy copy of the program into a Trojan. While none of the other authors polled have spotted Trojan versions of their programs, most have taken measures to safeguard their code and to copyright screens against tampering.

But authors generally agree that virus programs are more hype than reality. "I've never seen a virus, and I've never known anyone who has," says Medlin. "Not only that, the Association of Shareware Professionals has actually been spending a lot of time trying to track one down and reproduce it, but so far we haven't been able to do so."

The association, which just celebrated its first birthday, also educates the public about the differences between shareware and public-domain software and aims to establish professional standards for the genre. However, not all programmers are falling into line.

Vernon D. Buerg, perhaps the most widely known of public-domain authors, calls shareware a marketing ploy. "I'm not opposed to money, but I think that there should be more sharing," he says. His *List* text-viewing package includes a suggestion that users send him a "gift" of \$15, but that was tacked on simply to stop friends from nagging him, he says.

Shareware advocates, though, see a radiant future. *Qmodem* author Friel points to all the hackers who may have great ideas but don't know any venture capitalists. "How are they going to get their programs out to the world unless they distribute them as shareware?" he asks. "As bright young kids see the shareware successes, they'll realize this is the only way to show their own potential."

Coca Cola's Currid agrees. "You don't develop good software with written specs and bureaucratic procedures," she says. "If you want something really innovative, you turn a guy loose and let him do what he wants. That's what shareware is." ●

LEARNING TO SHARE

The quickest way to join the shareware scene is to dial into local bulletin boards or major on-line networks. But once you hook up, you may find yourself confronting a list of "downloadable" files longer than Deuteronomy. All of these probably have been compressed, so your first task is to download the applicable data-compression software. Beyond that, though, which packages will you want?

Your best source of information is other users. Not only can shareware aficionados steer you to the best programs for your needs, they can tell you how long the program's been around and how reliable the author is when it comes to bug fixes. So post a query on the bulletin board, or ask around at a user group meeting.

If you'd rather not deal with a BBS, try organizations that offer shareware on disk. PC-SIG is the most famous. The Houston Area League of PC Users' Public (Software) Library is another invaluable source. And don't neglect your user group, which is likely to keep its own extensive software library.

If you really want to exploit the bounty of shareware, assign one person in your company the task of searching and sorting it out, says

Coca Cola's Cheryl Currid. She suggests buying subscriptions to BBS's with large collections of shareware and public domain programs. (Depending on where you live, long-distance phone calls to download software may be cheaper than connect time on services like CompuServe.) She also recommends keeping abreast of publications like Nelson Ford's *Public (Software) Library Newsletter* and user group newsletters.

Should you be dogged by fear of Trojan horses, choose your distribution channels wisely. Download from bulletin boards with good reputations and keep abreast of Eric Newhouse's "Dirty Dozen," a regularly updated list of Trojans that is available on bulletin boards. The list also provides invaluable advice on protecting your system from Trojans. —J. G.

The Public (Software) Library

P.O. Box 35705
Houston, TX 77235-5705
713/721-5205

PC-SIG

1030D E. Duane Ave.
Sunnyvale, CA 94086
800/245-6717, 800/222-2996
California

Eric Newhouse's Crest

RBBS/CAMS (national clearing-house for Trojans)
213/471-2518

Judy Getts, a PC World contributing editor, writes on communications issues from Wauwatosa, Wisconsin.

For more information on products mentioned in the article, see Buyers' Guide: Best of Shareware.

Our shareware expert spotlights the best in low-cost, high-power programs. Before you spend big bucks on commercial software, check our guide for economical alternatives.

BEST OF TRUST SHAREWARE

When you spend hundreds for off-the-shelf name-brand applications, the greater part of your software dollar goes for fancy user interfaces and documentation as well as unseen marketing and sales forces. The best shareware word processors, spreadsheets, data bases, and utilities compete strongly with commercial applications in features, ease of use, and bug-free power but sell for a fraction of the cost. (Just don't expect them to run under Windows.)

A number of on-line and off-line sources offer shareware free of charge, with the expectation that satisfied users who adopt a program for regular use will pay a registration fee. Besides the fact that dodging fees is just not right, it can also mean missing out on accompanying documentation, telephone support, and program upgrade notices that are usually well worth the fee.

If you subscribe to an on-line service like *GEnie*, *CompuServe*, or *The Source* that maintains libraries of downloadable software, you can retrieve any program in our Buyers' Guide at normal on-line rates. Programs on these systems are stored in compressed format to minimize transfer time and storage space, so you'll need a program like *PKARC* (listed in the guide) to decompress downloaded files.

If you're not the modeming kind, user group libraries and commercial shareware distributors are another rich source of software. The premier distributor, PC-SIG, pub-

lishes a catalog, *The PC-SIG Library*, that lists thousands of programs (see *Sourcebooks*, PCW, March 1988, for a review). PC-SIG sells programs for \$6 a disk in both 5¼-inch and 3½-inch formats, or you can buy the entire library on CD ROM for \$295. Contact PC-SIG at 1030-D E. Duane Ave., Sunnyvale, CA 94086; 800/245-6717, 800/222-2996 in California.

Before you use a downloaded program, be sure to read any accompanying documentation files. Most programs include a README file that contains instructions for viewing or printing the manual, as well as important remarks on using the program.

Another good idea—especially for frequent on-line sojourners—is to back up your hard disk regularly. Viruses and Trojan horses sneak onto your hard disk to later wreak varying degrees of havoc. On-line services, commercial distributors, and most user groups carefully test software before placing it in their libraries. Private bulletin board systems are not always as meticulous, so novices might be better off staying with reliable sources.

Besides providing brief descriptions of top shareware applications in several major categories, this Buyers' Guide offers an extended list of indispensable utilities. Developers' addresses and phone numbers are listed where available, along with any services—beyond the basic permission to use the program—that come with the registration fee. Many programs do not charge a registration fee, even though they are still copyrighted and owned by their authors; others have been released to the public domain. In either case, the developers have little or no intention of offering technical support, upgrades, or any other service. Use this guide to help find the program that offers the right mix of features, services, and price for you.

George Campbell

WORD PROCESSING

Galaxy 3.0 An easy, no-frills, menu-driven word processor that includes a spelling checker and reads *WordStar* files directly. OmniVerse, P.O. Box 2974, Renton, WA 98056; 206/228-7627. Registration fee: with printed manual and unlimited phone support \$49.95.

New York Word 2.21 A command-driven word processor with on-line help, *NYW*'s features include math functions, line drawing, windows, footnoting, indexing, mail merging, and macros. Magma Systems, 138-23 Hoover Ave., Jamaica, NY 11435; 201/792-3954, 8 p.m. to 11 p.m. Registration fee: with printed manual \$45.

PC-Write 2.71 The shareware word processor with the largest number of registered users, *PC-Write* offers a spelling checker, on-line help, good printer and mouse support, windows, and macros (see *From the Software Shelf*, *PCW*, August 1987). QuickSoft, 219 First Ave. N #224, Seattle, WA 98109; 800/888-8088. Registration fee: with printed manual and unlimited phone support \$89.

DATA BASE MANAGEMENT

3X5 4.0 This flat-file manager can store data free-form or in a traditional field structure. An enhanced version, *3x5+*, offers variable-length records, improved indexing, report generation, and a word processor. Softshell, 1254 Thornbury Rd., West Chester, PA 19380; 215/793-1431. Registration fee: with product newsletter and support by mail \$49.95 (*3x5*), \$69.95 (*3x5+*).

PC-File+ 2.0 Probably the most popular of all shareware programs, *PC-File+* can handle data bases as large as 65,792 records. The program is fast, powerful, and easy to learn. A relational report generator, a label utility, macros, context-sensitive help, and a word processor are built in. ButtonWare, P.O. Box 5786, Bellevue, WA 98006; 800/JBUTTON. Registration fee: with printed manual and one year's support \$69.95; after the first year, support costs \$35 a year.

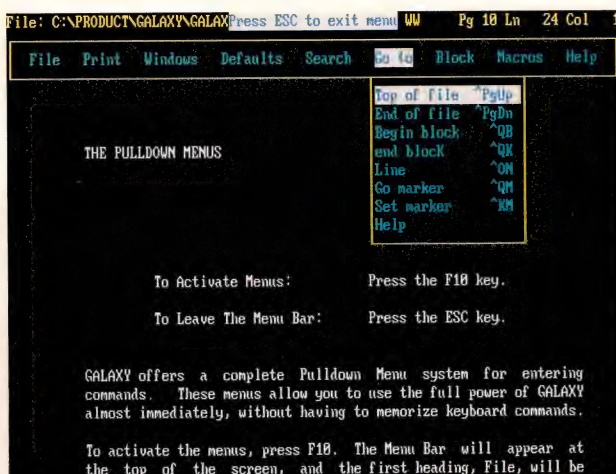
WAMPUM 3.1 *WAMPUM* is comparable to *dBASE III* in features and power but offers a menu-driven interface. It uses a *dBASE III*-compatible file structure and offers network support, multiple indexes, relational

functions, printer templates, macros, and password protection. Ward Mundy, 4160 Club Dr., Atlanta, GA 30319. Registration fee: for individual computers \$25, for network applications \$50.

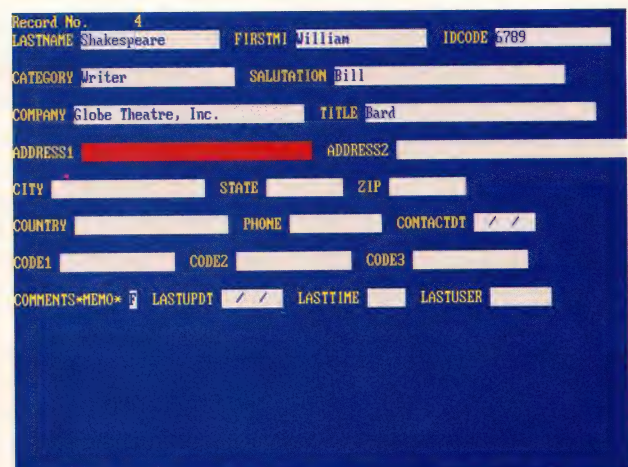
SPREADSHEETS

ExpressCalc 3.0 This spreadsheet looks, feels, and acts like *1-2-3* but can't handle worksheets larger than 64 columns and 256 rows. Automatic data-type recognition and recalculation, familiar commands, hidden cells, and flexible reports make *ExpressCalc* functional, if not flashy. Expressware, P.O. Box 230, Redmond, WA 98073; 206/481-3040. Registration fee: \$49.

PC-Calc+ 1.0 A powerful sibling of ButtonWare's *PC-File+*, *PC-Calc+* offers automatic graphing, split screens, context-sensitive help, macros, and coprocessor support, and it imports ASCII, DIF, *1-2-3*, *Symphony*, and comma-delimited files. ButtonWare. Registration fee: with printed manual and one year's support \$69.95; after the first year, support costs \$35 a year.

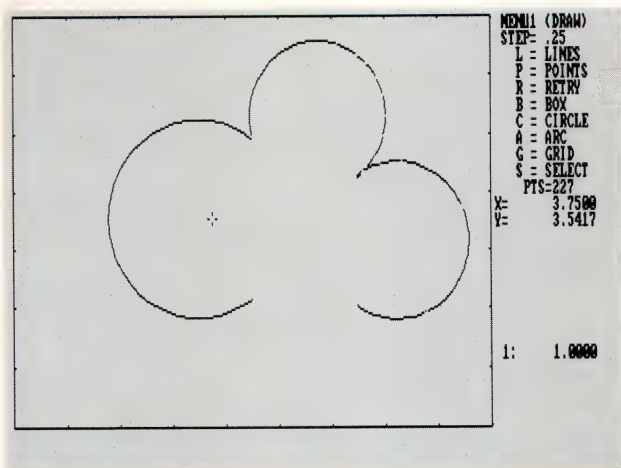


Galaxy

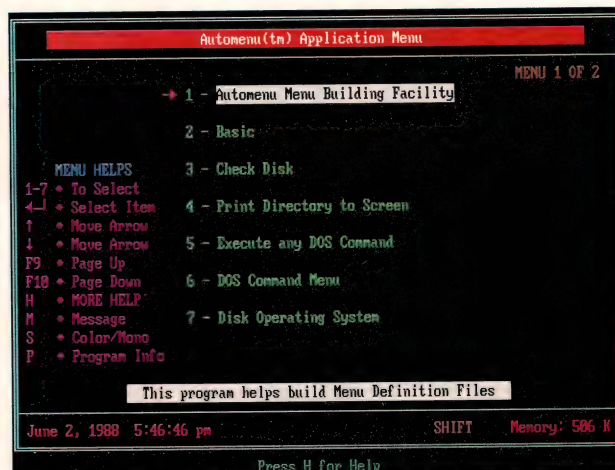


WAMPUM

Alt2:672: NUMBER (9)			Dir: C:\PRODUCT\QUBECALC				File: example	
Cell	Block	WorkQube	Insert	Delete	Print	Graph	File	Quit
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Curve Digitizer



Automenu

Baker's Dozen This collection of handy, nonresident desktop utilities includes a DOS shell, a mini-spreadsheet, a calendar, a file locator, text search features, sideways printing, screen capture, and a disk utility similar to that of *The Norton Utilities*. ButtonWare. Registration fee: with printed manual and one year technical support \$59.95; after the first year, support costs \$30 a year.

Homebase 2.5 A slick memory-resident utility, *Homebase* includes a DOS shell, a text editor, a data base, an appointment manager, a calculator, a communications program, and text cut-and-paste functions (see "Homebase—There's no Place Like It," *PCW*, July 1987). The program uses 180K of memory. Brown Bag Software, P.O. Box 60000, San Francisco, CA 94160-1719; 800/523-0764, 800/323-5335 in California. Registration fee: with printed manual and one year toll-free phone support \$89.95, with printed manual but no toll-free phone support \$49.95, program use only \$29.95.

ShortCut 2.05 This versatile, fast, and intuitive memory-resident DOS shell, which you can unload from memory on command, has a moving bar menu and context-sensitive help.

Mossy Rock Systems, P.O. Box 420876, Sacramento, CA 95841; 916/334-5542. Registration fee: with printed manual \$30.

UTILITIES

Program file names appear in parentheses to assist in on-line searches.

BigEcho (BIGECHO.ARC) This utility generates more than ten different large fonts on any display and is excellent for use within batch files. CTRLALT Assoc., 260 S. Lake Ave. #133, Pasadena, CA 91101. No registration fee.

Boots (BOOTS.ARC) *Boots* reboots your PC from the command line. It can do warm boots, cold boots, or lock out the <Ctrl>-<Alt>- function. Public domain.

Editor88 3.0 (E88.ARC) This small text editor with on-line help is ideal for creating short text files and batch files. M.R.E. Software, 150 Jones St., West Point, MS 39773. Registration fee: \$10.

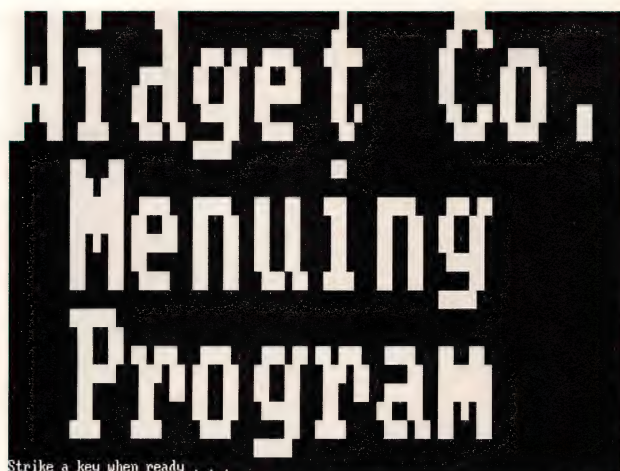
Extended Batch Language 3.08 (EBL.ARC) This utility lets you add user input functions, conditional branching, and other programming language features to batch files. Seaware, P.O. Box 1656, Delray Beach, FL 33444; 305/392-2046. Registration fee: with BBS support and additional on-disk documentation \$49.

FastCopy 2.0 (FSTCPY2.ARC) This utility uses both floppy drives to make multiple copies of disks twice as fast as DOS does. Systems Software Support, P.O. Box 751022, Houston, TX 77275-1022; 713/484-8060. Registration fee: \$20.

FastScreen2 (FSTSCRN2.ARC) This program converts a text file to a .COM file that displays the text on screen. It's perfect for batch files and for displaying help files and menus. Public domain.

FixBeep (FIXBEEP.ARC) Alter the frequency and duration of your computer's beep, or turn it off altogether. Mike Blaszcak, 112 Verlinden Dr., Monroeville, PA 15146. No registration fee; \$5 contribution suggested.

Fkey (FKEY.ARC) This utility reassigns function keys to produce DOS commands or other text strings. Public domain.



BigEcho

Filename.Ext	Bytes	Last Update	Filename.Ext	Bytes	Last Update
\APR88		01/11/88 09:48	MW	.INI	104 06/02/88 10:47
\ASSIGN		12/09/87 11:38	MW	.PGM	296768 10/12/87 13:40
\AUG88		05/13/88 11:34	MW420792.TMP	1024	05/26/88 10:42
\COMM		10/12/87 14:30	NORMAL	.GLY	1024 10/12/87 17:38
\CURRENT		10/12/87 14:49	\ONLINE		01/05/88 12:06
\FEB88		11/11/87 10:32	OUTLINE	.STY	1024 10/12/87 13:41
FULL	.STY	1536 10/12/87 13:41	PLAIN	.PRD	852 11/13/87 10:49
HP2000	.GLY	1536 10/12/87 13:41	POSTSCRIP	.INI	10434 03/16/88 12:19
HYPH	.DAT	24072 10/12/87 13:41	POSTSCRIP	.PRD	16350 03/16/88 12:19
\JUL88		04/19/88 11:45	SAMPLE	.STY	1024 10/12/87 13:41
\JUN88		03/18/88 05:33	SEMI	.STY	1536 10/12/87 13:41
LOG		06/02/88 10:26	SIDEBY	.STY	1024 10/12/87 13:41
MACRO	.GLY	15360 10/12/87 13:41	SPELL-AM	.EXE	111948 10/12/87 13:41
MAKEPRD	.EXE	30450 10/12/87 13:43	SPELL-AM	.HLP	3715 10/12/87 13:42
MAR88		12/02/87 15:59	SPELL-AM	.LEX	175173 10/12/87 13:42
MAY88		02/10/88 11:44	TTY	.PRD	852 11/13/87 10:48
MEMO		11/25/87 12:56	UPDAT-AM	.CMP	468 05/11/88 13:51
MEMO	.GLY	640 10/12/87 13:41	WFGC	.SYN	327488 10/12/87 13:43
MERGEPRD	.EXE	46007 10/12/87 13:41	WORD	.COM	51710 10/12/87 13:40
MOUSE	.SYS	14325 10/12/87 13:44	\WORD4WOR		10/21/87 12:28
MW	.HLP	65006 10/12/87 13:40			
		41 Files, 1201450 Bytes 2392 Sec.			

SDL

FXMaster 3.2 (FXMASTER.ARC) This memory-resident printer utility lets you set all functions of an Epson MX/FX/LX or compatible printer from a pop-up menu. Brian Raub, 14 Rolling Rd., Overbrook Hills, PA 19151. Registration fee: \$10.

List 6.2a (LIST62A.ARC) Infinitely superior to DOS's TYPE command, *List* lets you browse through a file in any direction. Vernon D. Buerg, 456 Lakeshire Dr., Daly City, CA 94015. Registration fee: \$15.

LQ 2.0 (LQALL.ARC) This memory-resident print-enhancement utility creates multiple fonts and letter quality output on your 9-pin Epson-compatible printer. Granny's Old-Fashioned Software, Rt. 4, Box 216, Boone, NC 28607. Registration fee: \$35.

MasterKey (MSTRKEY.ARC, MKEY.ARC) A full-featured DOS utility program comparable to *The Norton Utilities*. R. P. Gage, 1125 6th St. N #43, Columbus, MS 39701. Registration fee: \$20.

Move 1.0 (MOVE.ARC) This utility copies files from one directory to another, then deletes the original file.

Excel-Soft, 24 High Point Rd., Lincoln, NJ 07738. Registration fee: \$10.

PKARC 3.5 (PKX35A35.EXE) The best file compression and archiving utility available. PKWare, 7032 Ardara Ave., Glendale, WI 53209. Registration fee: \$20.

Qdups 1.5 (QDUPS.ARC) This utility locates duplicate files on your hard disk and lets you choose which ones to delete. Claude Biron, 103 W. 23rd Ave., Vancouver, British Columbia, V5Y 2H1 Canada. No registration fee; \$15 contribution suggested.

Ramdisk (RDISK.ARC) You can change the size of this removable RAM disk or unload it from memory at any time. Public domain.

SDL 3.0 (SDL.ARC) This two-column version of DOS's DIR command also lists file attributes. Public domain.

TheDraw 2.21 (TDRAW221.ARC) This ANSI-based screen design utility for programmers features color, animation, and on-line help. TheSoft Programming Services, 1929 Whitecliff Ct., Walnut Creek, CA 94596. Registration fee: \$10.

Timer 1.5 (TIMER.ARC) This utility times the length of use of any program and displays it on screen when you quit—useful for billing purposes. Calvin Shields, 6605 Lure Ln., Louisville, KY 40229. No registration fee; \$1 contribution suggested.

TSR 1.6 (TSR.ARC) Unloads memory-resident programs, freeing system RAM. Public domain.

Waitn (WAITN.ARC) Allows you to pause batch-file execution for a specified length of time. Public domain.

Whereis 4.0 (WHEREIS4.ARC) Searches multiple disk drives for files; accepts wild cards. Public domain.

XEQ (XEQ.ARC) Saves disk space by archiving short .COM files into a single library file. Hardwood Software Assoc., 143 Ash St., Hopkinton, MA 01748. No registration fee. ●

George Campbell is a contributing editor for Compute's PC Magazine, for which he writes a column on shareware.

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Of course, in order to compete with the Utilities, this upstart new package first had to copy it.

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Right down to the user interface which, according to the *InfoWorld* Review Board makes the Advanced Edition "as easy to use as possible."

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We just call it good company.

Peter Norton
COMPUTING

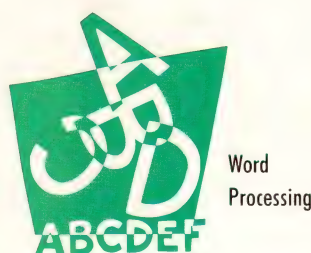
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Circle 92 on reader service card

Word Speedup Tips

A treasure trove of tips lends wings to Microsoft Word.

There's something for everyone, whether you use version 3.0 or 4.0.



George Campbell

Microsoft Word is one of those products that does practically everything right but often takes its time about it. The program's latest incarnation really flies (see "Word 4.0: Fast at Last," *PCW*, February 1988), but impatient users always want to stretch the envelope. Thanks to some little-known tricks, you can push versions 3.x and 4.0 to their limits without buying extra utilities—or strapping on test-pilot gear.

Jump-Start 3.0 in Character Mode

Word's graphics mode is one of its most popular features, but the price of being able to see italics and other real-life formatting is slow scrolling. One of the easiest ways to speed up Word 3.x is to start it in character mode (4.0's default). Rather than typing WORD at the DOS prompt to load the program,

type WORD/C. Depending on your processor, the payoff is at least a 25 percent speed gain.

In character mode, most text attributes are represented by underlining or color changes, depending on the monitor type. Unless you're preparing a document with a number of character formats, character mode should be sufficient; you can always load Word in graphics mode (WORD/G) later to view those italics. In Word 4.0 you can toggle instantly between character and graphics modes by pressing <Alt>-<F9>. If your enhanced color display is driven by an EGA with only 64K, you can get a high-resolution black-and-white graphics mode (instead of the coarse CGA-emulation mode) by starting Word with the /M switch.

Specify the File

To start work faster, you can simultaneously bring up Word and the file you want to edit using a single DOS command. At the prompt, simply type WORD, a

space, and the name of the desired file. The file can be located in any drive or directory; just include the drive and/or path before the file name. For example, the command `WORD C:\DOCS\REPORT` tells *Word* to load the file `REPORT.DOC` located in the `\DOCS` directory of drive `C:`. You can also use this technique to create a new file quickly—just specify the new file's name and answer `Y` to the 'Enter `Y` to create file' prompt.

If you want to edit the last file you worked on, you can even dispense with the file name. Type `WORD/L` at the DOS prompt, and *Word* pops open the document and shoots the cursor to its last location in the file. (Note that switches can also be combined: To edit the last file in character mode, you'd type `WORD/L/C`.)

Create Printer Templates in 3.0

When you start *Word 3.0* without specifying a file, it assumes that the first printer and the first font listed for that printer are the defaults. (*Word 4.0* defaults to those of the last file edited.) Changing those values for each new document means wending your way through *Word's* multilevel Print and Format menus. But there's a better and faster way: Load *Word 3.0* with an empty file that has the de-

faults you want, type in the new document, and save the results under a different name. You can use a printer template with any document and generate a library of custom printer templates for any number of special occasions.

To create a template, start *Word 3.0*, open a file named `SETUP.DOC`, press the `<Space>` bar once, press `<Esc>`, and type `PO` to reveal the Print Options menu. Select the printer and any desired options, and press `<Enter>` to record your choices. Move to the Format Character menu with `<Esc>FC`, tab over to the 'font name:' option, select a font, and press `<Enter>`. Then save this file.

The next time you want to create a new document with this specific printer configuration, type `WORD SETUP` at the DOS prompt, press `<Enter>`, and type merrily away. Save the document with a different name, and the `SETUP.DOC` template is preserved.

Remove Menu and Borders

If you want to cut down on scrolling, enlarge the on-screen working area by removing *Word 3.x's* three-line menu. *Word 4.0* users can gain another few lines by removing screen borders. To suppress the menu display, press `<Esc>` and select Options. At the 'menu:' option, select No. In *Word 4.0*, skip over to the 'screen borders:' option and like-

wise select No. Press `<Enter>`, and the menu and *4.0* borders vanish. As with all Options choices, these settings become the default when *Word* starts. Note that the menu reappears whenever you press `<Esc>`.

Speed Up the Cursor

If you use *Word 4.0*, there's a trick hiding in the Options menu that accelerates *Word's* cursor and all keystroke repeats. Look for the 'cursor speed:' option and enter a number from 0 (very slow) to 9 (lightning fast); *Word's* default is 3. On an AT, 5 is probably right; on an XT, you may want a higher setting.

Use 4.0's Autoexec Macros for Repetitive Tasks

Now that *Word 4.0* features a macro processor equal to *Word-Perfect's*, you can put macros to work speeding up mundane operations. For example, you can quickly create a macro that always directs *Word* at start-up to log on to a specific directory, such as `C:\WORD\LETTERS`, and present a directory listing. The secret lies in modifying *Word's* Autoexec glossary, which automatically executes whenever *Word* is loaded.

To make such a macro, you would load *Word 4.0*, start

macro recording by pressing <Shift><F3>, select <Esc> Transfer Options, type C:\WORD\LETTERS, and press <Enter><F1>. Then press <Shift>-<F3> to end macro recording. When *Word* prompts you for the name of the macro by displaying 'COPY to: { }' at the bottom of the screen, you would type Autoexec and press <Enter>. (If you also wanted to trigger this macro with a <Ctrl>-key combination, such as <Ctrl>-LT, you would type Autoexec^<Ctrl>-LT instead.)

If you want this macro to run every time *Word* loads, save it in *Word*'s default NORMAL.GLY glossary, by selecting <Esc> Transfer Glossary Save and

pressing <Enter>. If you later want to remove the macro from NORMAL.GLY, select <Esc> Transfer Glossary Clear. Press <F1> to list the glossary names, select the one you want to zap, press <Enter>, and answer Y to the 'Enter Y to erase glossary names' prompt.

Use Glossaries to Save Keystrokes

To shave seconds off the time it takes to enter text, create a personal glossary of oft-used words and phrases. When you find yourself repeatedly typing a phrase like *as soon as possible*, add it to the glossary. Later, you'll be able to insert a word, a phrase—even whole paragraphs—with a few keystrokes. The trick works with versions 3.x and 4.0.

Any combination of characters can be added to the glossary. Simply highlight the text in question and select <Esc> Copy. At the 'COPY to: { }' prompt, supply a memorable keyword, such as ASAP, and press <Enter>. The entry now has a name—but no glossary to call home. To create the glossary and save the entry, type select <Esc> Transfer Glossary Save. You'll notice that *Word* suggests NORMAL.GLY as a glossary name. Since you're creating a special glossary, replace NORMAL.GLY with some easy-to-remember name—such as MYGLOSS—and press <Enter>.

Now you must attach the glossary to the current document. Select <Esc> Transfer Glossary Merge, enter the name of the

glossary (MYGLOSS), press <Enter>, and you're ready to roll. To insert the phrase *as soon as possible*, simply type the keyword ASAP, press <F3>, and the text pops into place. You can stuff more phrases into the glossary at any time and retain character or paragraph formatting information already in effect. When you exit *Word* or load a new document, you'll be prompted to save the altered glossary.

If you use a dummy SETUP.DOC file when starting *Word*, you can merge this personal glossary with the default NORMAL.GLY glossary, and it will be loaded every time *Word* is started. To merge the two glossaries, select <Esc> Transfer Glossary Merge and type SETUP.DOC. But if the glossary is a highly specialized one that's used only occasionally, save it separately and call it up as needed.

Format Documents First

If you think a new document's style will be relatively uniform throughout, format the piece before you enter any text. By pre-selecting such variables as page size, font, justification, and margins, you can save many steps at print time and monitor the changing appearance of your document. The technique is much faster than using *Word*'s style sheets, which are best suited for complex documents that incorporate many formatting changes. Just make sure you're satisfied with the format you choose.

Before entering any text, press <Enter> four or five times to create some blank lines. Press <Shift>-<F10> to select the

POWER TIP NO. 4

Quick Microsoft Word Spelling Checks

To track down a single questionable word with the *Microsoft Word* spelling checker, you must select Lookup from the Library Spell menu, type in the word, and press <Enter>. As a faster alternative, try the thesaurus. By pressing <Esc>LE (or <Ctrl>-<F6>), you can confirm whether your suspect word exists and, if so, whether it's misspelled. The thesaurus also suggests other words you might be looking for—often, the correct one.

Robert Luhn
Senior Editor

area. Now use *Word*'s menus or its shortcut formatting keys to set margins, page size, line spacing, and any other characteristics you will use throughout the document. Once the basic format is in place, return the cursor to the top of the screen and start typing. The text will automatically conform to the electronic mold you've created.

If you generate a variety of documents requiring different formats, create a series of matching preformatted SET-UP.DOC files as described earlier, load the appropriate file, and start typing. Don't forget to save the completed document with a different file name to preserve the template.

If you use *Word 4.0*, you can save even more time by creating macros to automate the preformatting process. In addition, you can use 4.0's line-draw function to create forms for receipts and invoices.

Search and Highlight Text Fast

Word has few peers when it comes to speedily selecting a sentence, line, or paragraph for block operations. But selecting a word or a phrase located far from the cursor can be maddeningly slow, especially if you use *Word 3.x* or lack a mouse. With *Word*'s search function, however, you can select a word or phrase in a flash. If you need to highlight text starting at the cursor, switch on *Word*'s Extend Selection command first by pressing <F6>; this technique works when searching both forward and backward in a document.

To quickly select a word, issue <Esc> Search, enter the text, and press <Enter>; *Word* zips to the word and highlights it. If you want to select a swatch of text starting at the cursor, press <F6>, issue <Esc> Search, type in the few words at the end of the desired text, and press <Enter>.

Similarly, you can use *Word*'s Jump command to highlight text from the cursor to a specific page. (Naturally, you must paginate the document with <Esc> Print Repaginate before using the Jump command so you know where you're jumping to.) That done, you can press <F6> to anchor the extended selection highlight, issue <Esc> Jump, supply the page number, and press

<Enter>. The highlight will scurry to the top of the appropriate page. You can also combine the <F6>-plus-Search approach with other cursor keys, such as <Home> or <Ctrl>-<End>.

Time- and Date-Stamp Documents

If you have a clock/calendar board in your PC, or if you regularly set the system date and time when you restart the computer, *Word* offers a quick way to enter the date or time. Just position the cursor at the desired location on the page, type date or time, and press <F3>. *Word* automatically substitutes the system date or time in the document.

Split Up Long Documents

To speed document loading, saving, and scrolling, split very long documents into logical sections for preliminary editing, saving each section as a separate file. Once you've finished editing, use <Esc> Transfer Merge to combine the documents for pagination and document-wide operations.

None of these tips requires extra hardware or sweaty exercise, but they can make a real difference in day-to-day operations. *Word 3.x* users who choose not to upgrade can overcome much of that version's lethargy, and 4.0 users can really make the program fly. Who's the winner? The envelope, please. ●

George Campbell is a columnist for Compute's PC Magazine. He lives in Los Osos, California.

POWER TIP NO. 5

Generic Print Files in Microsoft Word

Microsoft Word users who mail document files on disk or telecommunicate text files to users who don't use *Word* can create a print file that retains *Word*'s pagination, margin settings, headers and footers, and page numbers. Select the PLAIN.PRD printer driver from the Print Options menu, or copy it from the *Word* printer disk, and press <Enter>. Then press F (File), type a file name, and press <Enter>. Instruct the recipient to send the file to a printer with the DOS COPY command by typing COPY filename.DOC PRN.

*George Campbell
Los Osos, California*

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Ventura Publisher	493

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— HARDWARE —

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CONSUMER WATCH

Advice and information for the computer consumer

Interested in a \$1995 printer for \$398? Here are some retail outlets that offer heady bargains—provided you shop with caution.

Anita
Amirrezvani

Let's Make a Deal

If you have a sense of adventure and are willing to do some research, you can find excellent bargains by shopping through liquidators, auctioneers, or surplus stores. Typically, these outlets buy large lots of new or used merchandise and sell it to consumers at dramatic discounts. The goods come from diverse sources: vendors about to go out of business, healthy companies that need to sell off excess inventory, and manufacturers liberating themselves of discontinued items.

Damark International in Minneapolis is a liquidator that offers a broad range of products. "We buy and liquidate everything from soup to nuts," says David Russ, vice president of purchasing. "We do a lot of computer business simply because that industry is prone to drastic changes. Whenever obsolescence occurs, we're able to step in and offer large quantities of a product below dealer cost."

Damark recently advertised a Xerox/Diablo 630 letter quality printer for \$398 plus \$26 shipping; the manufacturer's suggested retail price was \$1995. "Xerox's wholesale cost on the product was about \$900, and of course we bought it for much less," says Russ.

ANTHONY RUSSO

Most of the computer products Damark sells come with full manufacturer's warranties. "Manufacturers benefit by continuing to service the customers because then they can sell them cables, or whatever," says Russ. "Usually they'll stand behind their products."

Similar bargains are available through COMB, a general liquidator also located in Minneapolis. A typical COMB catalog recently offered a no-name modem with telecommunications software for \$79, Polaroid disks for \$39 per 100, and a 384K memory board for \$129 plus shipping. Both COMB and Damark send catalogs upon request.

But not all liquidators offer manufacturer's warranties, and most don't provide technical support. Take the Computer Surplus Store in Milpitas, California, which co-owner Chuck Schuetz describes as "probably the largest surplus store in the world." Housed in a 100,000-square-foot building, the Computer Surplus Store sells everything from \$59 refurbished monitors to sophisticated high-tech and scientific equipment. The company even sells products that don't work—like a 20MB hard disk drive for \$35.

"Generally, we guarantee working items for 30 days, with replacement or repair," says Schuetz. "But we don't offer any technical support. That's why we ask buyers to do their homework. Customers who know
(continues)

what they're doing get a very good deal and take a little bit of a chance."

Like many liquidators, the Computer Surplus Store encourages bargaining. "As we say in our ads, 'It's like a swap meet every day,'" says Schuetz. You can also ask the company to keep an eye out for specific products.

Some companies sell liquidated products in addition to their regular inventory. Dallas-based BG Micro offers chips, controllers, sockets, switches—as well as a \$29.95 printer. "That printer was originally made by Canon for the PCjr, and we have a little \$3 adapter that makes it compatible with other PCs," says manager Tammy Mayse. "We also sell a PC XT-compatible keyboard for \$25, or three for \$69.95."

Mayse cautions consumers to shop around for the best price before buying an item advertised in a liquidation sale. "Just because the ad says liquidation doesn't mean you're getting the lowest price," says Mayse. "I found this out through experience—I bought a Canon electronic typewriter through a liquidator for \$219, and a month later I saw it in a retail store for \$198."

If you need software, one large source is AT&T Liquidators, a retail store and mail-order outlet in Santa Ana, California. Manager Art Tendler boasts an inventory of 1 million programs—something for every computer ever made, including IBMs, Osbornes, DEC's, VIC-20s, and Ataris.

"The maximum we sell anything for is 75 percent off retail," says Tendler. "Most of our items go for \$9.95 to \$19.95."

Tendler also organizes retail liquidation sales across the United States. Consumers can sign up on the company's mailing list to be informed about sales in their area.

And Tendler offers an unusual incentive: "Everything we sell is 100 percent guaranteed. If consumers don't like a product, we'll exchange it or refund their money. I also guarantee the lowest price in the world."

Shopping at auctions is another way to get bargains. Ross-Dove, a high-tech auctioneer in Foster City, California, sells more than \$50 million worth of equipment per year, according to marketing vice president Alex Steele. "Consumers can usually save between 20 and 25 percent by buying from us," says Steele. "A used PC in good condition that normally retailed for \$2000 would probably sell for about \$1500."

Auctions are usually held once a week and are advertised in the *San Francisco Chronicle*, the *Los Angeles Times*, and the *Boston Globe* and listed on an auction calendar mailed out to interested parties. All items are open to public inspection one day before the auction and on the morning before the sale. Most items don't require minimum bids, and buyers pay no commission. Naturally, the better you know the market, the more likely you'll be able to bid intelligently.

But consumers should shop with care. Says Steele: "We don't test the equipment before putting it up for sale. If we surmise that there's a defect, we'll say so, but the buyer buys it as is."

That's a risk many shoppers are willing to take. For best results, however, take some precautions before shopping at an auction or a liquidation sale.

Learn how to examine a product for defects; familiarize yourself with market values; and scope out available security blankets, like warranties and technical support. And when you see a bargain, pounce on it—most liquidated items come in limited quantities.

AT&T Liquidators

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BG Micro

P.O. Box 280298
Dallas, TX 75228
214/271-5546

COMB

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Minneapolis, MN 55440-9176
800/328-0609

Computer Surplus Store

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Milpitas, CA 95035
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(orders)

Damark Int'l

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Minneapolis, MN 55443
800/445-2191

Ross-Dove

1118 Chess Dr.
Foster City, CA 94404
415/571-7400

SHOP TALK

In Short Supply

I've encountered problems with SupplyLine, a mail-order company in Lombard, Illinois. I placed a small order for some printer ribbons on February 9, using a credit card to pay the \$74.63 bill. In a follow-up call on March 8, SupplyLine said my order had been shipped February 19. Knowing that the Army post office system is painfully slow at times, I waited. I began trying to contact SupplyLine again at the end of March, getting busy
(continues)



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- “Desktop Publishing: Personal Productivity Tools for the 1990s,” keynote speaker, Theodor H. Nelson, Inventor of the concept of Hypertext and designer of Xanadu™
- “Office Publishing: the Future of Work Processing,” keynote speaker, Henry Ancona, Vice President of Business & Office Information Systems, Digital Equipment Corp.
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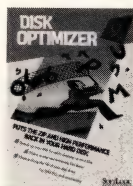
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signals both day and night. Since then, I've found out that Supply-Line's phones have been disconnected, with no further information available for the long-distance consumer.

James T. Zdrowski
United Kingdom

Editor's note: In a visit to SupplyLine's offices, PC World found no signs of life or business. Any problems with orders should be handled in the usual manner: Because Mr. Zdrowski paid by credit card, he can contact his credit card bank by mail and explain why he wants the charges removed. Customers who paid by check should send a letter of complaint to Consumer Watch and to Office of the Attorney General, Consumer Protection Division, 100 W. Randolph, 12th Floor, Chicago, IL 60601, or call 312/917-3580 for information.

Torn Between Two Word Processors

For the past year I've enjoyed using *PFS: Professional Write* despite its limitations. But when I saw an ad offering *PFS's* major competition, *Q&A*, for just \$29.95 plus the title page from my *PFS* manual, I decided to try it. No sooner had I received *Q&A* that I got a note about the new upgrade to *Professional Write*. Even though I am a registered user, the company refuses to honor my right to an upgrade because I do not have my title page. Nowhere do they state that the title page is necessary.

Mark J. Heulitt, M.D.
Durham, North Carolina

Editor's note: In a phone interview, Software Publishing spokesperson LaVon Collins said that sending the title page is not

required. "If you don't have your title page, photocopy the front of your disk and send that to us as proof of purchase," Collins said. But first, users should explain their situation to a Software Publishing upgrade representative at 800/255-5550. Then, in a letter requesting the upgrade, users should specify whom they spoke with at Software Publishing.

Looking for Logisoft

I've noticed that Logisoft's ads, which regularly appeared in *PC World* and *PC Magazine*, have been absent since last December. Do you know what has happened?

David Kohn
Tucson, Arizona

Editor's note: Logisoft public relations director Rick Liotta says the company discontinued all its magazine advertising at the end of last year. "We are now concentrating our efforts on direct marketing and catalog sales," says Liotta. The best way to find out about products and prices is to call or write Logisoft and request a copy of the company's catalog. The phone number is 800/645-3491.

Meanwhile, Consumer Watch sent four consumer complaints to Logisoft early this year, most touching on problems with getting refunds. Consumer Watch never received a response, but according to Liotta, "We've had a few people asking about their credits being held up. The reasons have to do with some backlog and a miscommunication with our financial institution, but it's all being cleared up." (continues)

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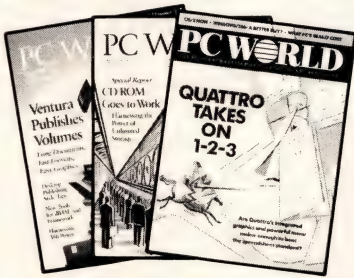
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The PC-8000's Bad Memory

The Federal Trade Commission (FTC) has charged NEC Home Electronics with deceptively advertising from 1981 to 1984 that consumers could easily increase the amount of RAM in PC-8000 computers by purchasing a 32K memory board. In fact, according to the complaint, memory expansion required either special programming skills or access to an operating system that was never sold in the United States.

In March a consent agreement was put forward for public comment. The agreement (which is not an admission of guilt) requires NEC Home Electronics to pay a total of \$15,000 to 100 consumers who purchased the 32K memory boards. The company must also refrain from making false claims about the memory capabilities of its products.

If you purchased one of the memory boards, contact the FTC at 202/326-2180 to find out if the consent agreement has been made final. You can then apply for a refund by writing NEC at 1255 Michael Dr., Wood Dale, IL 60191-1094.

PC Plaudits

In April I received a Western Union mailgram from Brøderbund Software advising me of a flaw in the upgrade to *Memory-Mate* (a text indexing and retrieval program). I did not get around to using the upgrade, so I have not suffered any as a result. But I want to congratulate and thank the Brøderbund organization for being responsible businesspeople and advising me in a prompt manner. I know it cost a substantial amount of money.

Alan Saltzman
Hollywood, California

Editor's note: According to Brøderbund spokesperson Jenay Cottrell, old MemoryMate text files did not transfer correctly into the new version. An amended version of the upgrade shipped at the end of May.

Got a gripe? Want to set the record straight? Write Consumer Watch, PC World, 501 Second St., San Francisco, CA 94107, or use MCI Mail PCWORLD/179-3813, CompuServe 74055,412, or The Source STE908. Include your name, city, state, and daytime telephone number with all correspondence. All letters are subject to editing. Due to the volume of mail, we cannot acknowledge every letter. ●

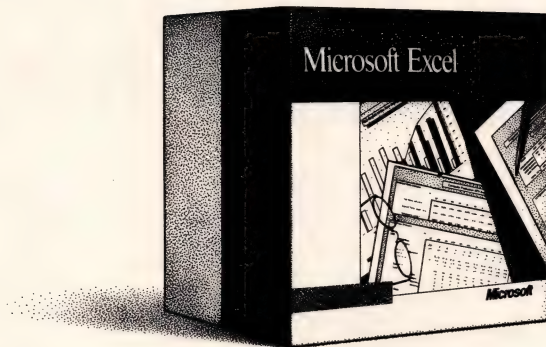
POWER TIP NO. 6

Antivirus Vaccine

You can protect hard disk data from dangerous virus programs with the DOS ASSIGN command. Before you load a suspect program, type ASSIGN C=A at the DOS prompt and press <Enter>. If a virus program then tries to access drive C:, DOS will send the call to drive A: instead. At this point, you can run the program and inspect it for a virus. Once you're satisfied that the program is clean, undo ASSIGN by typing ASSIGN and pressing <Enter>.

George Campbell
Los Osos, California

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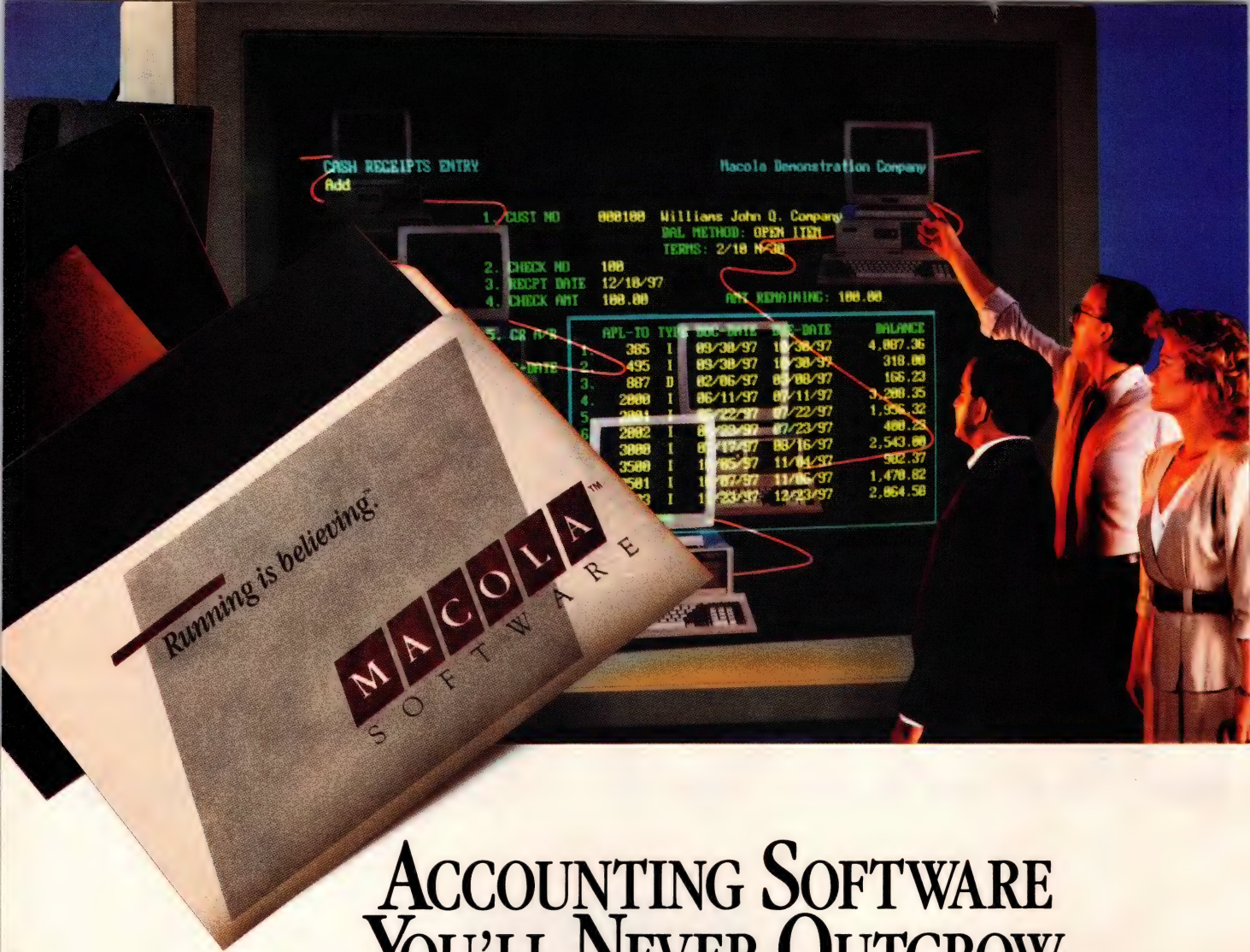
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Stash the system unit, tune up your disk drives, format 720K disks in 1.44MB drives, use Lap-Link with the Model 80, settle the conflict between Express and Word, upgrade a Compaq Portable with a 3½-inch drive, and more

**Karl
Koessel**

Stand-Up System

Q. *I'm quite happy with my AT clone—except that it takes up so much room on my desk. I've seen IBM ATs standing on their sides under people's desks. Can I do this without damaging my clone? I'm particularly worried about the hard disk.*

*Anne White
Santa Barbara, California*

A. Sure. You can buy a plastic stand made just for that purpose or make a stand yourself. Just be sure that the system unit will not accidentally tip over (the hard disk may not survive a fall), that there's plenty of airflow so the machine won't overheat, and that you don't jolt it when vacuuming, especially if you leave the system (and therefore the hard disk) running.

Back on Track

Q. *My PC clone is about three years old, and lately it's started to act up. Sometimes a disk that works perfectly in drive A: can't be read by drive B:, and vice versa. I get the error message 'Data error reading drive A:; Abort, Retry, Ignore'. Pressing R for Retry works sometimes, but other times it doesn't. What's wrong with my disk drives? Do they need to be replaced?*

*John Hamilton
Charlotte, North Carolina*

A. Could be that the drive is getting read errors simply because the disk is not centered. The drives work by positioning an arm, called an actuator, that holds a magnetic read/write recording head (similar to that used by a tape recorder) over one of 40 concentric recording tracks (80 for high-density drives). Try gently opening and half-closing the drive door a few times to center the disk before it's clamped into place.

Read errors can also occur when the disk isn't spinning fast enough because it is pinched by its protective jacket. Grab the disk at the center hole's rim and test whether it turns easily within the jacket. If not, square the edges of the jacket to reduce the pressure on the faces of the disk. (This problem is often caused by overstuffing disk storage boxes or keeping disks in or under books and magazines.)

However, it may be time to get your floppy disk drive heads realigned. After one or two years of use, it's not unusual to find that the actuator no longer positions the head accurately over a given track. Your local computer store or repair shop can easily give your PC drives the inexpensive tune-up they need.

(continues)

1.44MB Drives Yield 720K Disks

Q. *My IBM PS/2 Model 80 at work has a 1.44MB floppy disk drive. At home I have a laptop that uses 720K disks and can't read the Model 80's 1.44MB disks. When I want to bring data home, I have to remember to format a 720K disk on the laptop and then copy my data onto that disk from the Model 80. Occasionally I find that I haven't remembered to bring in a 720K disk and thus can't take work home. Isn't there a way to format disks to 720K in the IBM PS/2 Model 80?*

*Alan King
Provo, Utah*

A. Yes. Use the command **FORMAT A: /N:9 /T:80** (followed optionally by **/S** if you want a bootable 720K floppy). This command works on Model 60s, too. It tells **FORMAT** that you want a disk with nine sectors and 80 tracks, the format for 720K DOS disks.

Word and Express

Q. *I use Microsoft Word on an IBM AT and recently purchased Lotus Express, a memory-resident, background-communications program for MCI Mail users. One major benefit of Express is its ability to receive E-mail while I work in another program. However, I can't run the programs simultaneously. When I load Word after Express has been installed, my system freezes. How can I get these two applications to work together?*

*Marc Schlesinger
Los Angeles, California*

A. I'll bet you have an enhanced 101-key keyboard. If that's the case, all you have to do to get *Lotus Express* and *Microsoft Word* to work together is invoke *Word* with the command **WORD /K**. Of course, when you forget, the system will freeze. To circumvent that problem, create a batch file to start *Word* with the proper command string. If you don't already have a directory called **C:\BATCH**, make it and use it for all your batch files. Log on to the **\BATCH** directory and create a batch file called **WORD-.BAT** that simply contains the command **C:\WORD\WORD %1 /K** (if your *Word* files are on a different drive or in another directory, adjust the command appropriately). Finally, edit the **PATH** command in your system's **AUTOEXEC.BAT** file to remove its reference to the drive and directory containing *Word*'s program files (usually it's **C:\WORD**), and add **C:\BATCH**; to the beginning of the list of directories. Reboot and, with *Express* loaded, you can run *Word* by typing **WORD** followed by a space and the drive, path, and name of the document file to edit.

With that problem out of the way, you'll notice that if *Word* is in graphics mode, *Express* won't come up when you press **<Alt>-<Shift>-X**. Simply press **<Alt>-<F9>** to toggle to text mode, and then call up *Express*.

You'll probably want to use *Lotus Express Reader* to compose most of your E-mail. Occasionally you'll want to transmit a *Word* document; it must be prepared before it can be properly sent as E-mail. After you have saved an E-mail document with a right margin of your choice but with no left, top, or bottom mar-

gin (**<Esc>** Format Division Margins), use **<Esc>** Print Options to select the **PLAIN** printer driver and then **<Esc>** Print File to print the document to a disk file. Then load that new file, remove the extra carriage returns and page breaks, if any, at its end, and resave it unformatted. It's now ready for transmission.

Lap-Link and the PS/2 Model 80

Q. *Release 2 of Lap-Link Plus is supposed to be compatible with IBM PS/2 computers. When transferring files between my laptop and my AT, I had no problems with the program (except for conflicts with a few memory-resident programs, which I now remove before using Lap-Link). But now that I have an IBM PS/2 Model 80, Lap-Link no longer works. Doesn't the program work with the Model 80, as the banner on its package implies?*

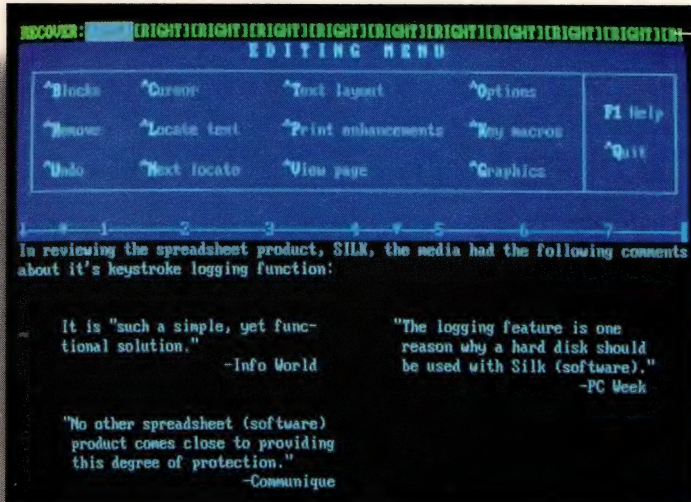
*Sam Torini
Atlantic City, New Jersey*

A. It will, but the Model 80's design doesn't let *Lap-Link* run in turbo mode or faster than 19,200 bps. To transfer files, bring up *Lap-Link* and press **0** for Options. Press **<Cursor Up>** four times, highlighting 'Turbo Copy Mode:', and press **N** to select 'No'. Press **<Cursor Up>** twice and **<Cursor Left>** twice to set the speed to 19,200 bps. Then press **S** and **4** to save these settings. Repeat this procedure for the other computer to establish the connection.

(continues)

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Null and Word

Q. *Is there a way to send the null code (ASCII 0) from Microsoft Word to my printer? I have contacted Microsoft, and they were unable to help me. Word can send every other ASCII code to the printer. The ability to send the null code would enable me to switch from a downloaded character set to the printer's standard, ROM-based character set. The null code is a component of many printer command sequences and would be useful in other situations.*

*R. L. Droste
Nepean, Ontario, Canada*

A. It is unfortunate that Word can neither accept nor issue the null character. However, you can use Word's <Esc> Library Run command to execute the DOS command COPY codefile PRN, where codefile is the name of a file containing the appropriate printer command sequence. Use Word to enter the command sequence, substituting the word NULL for the null character. Save the file with a name such as ROMCHARS on a disk in drive B:, and quit Word. Place a copy of EDLIN (from your DOS disk) in drive A:. Type **A:EDLIN** **B:ROMCHARS.DOC** and press <Enter>. Type 1 and press <Enter>. Press <Cursor Right> repeatedly until the word NULL is revealed, then press <Cursor Left> four times and <Delete> four times. Press <Insert>, type <Ctrl>-V and then @ (<Shift>-2), and press <F3> and <Enter>. Finally, press E and <Enter> to save the file and

exit. Copying ROMCHARS.DOC to the printer (PRN), whether from within Word or from the DOS prompt, will now activate the ROM-based character set.

3½-Inch Drive in a Compaq Portable

Q. *In addition to my Compaq Portable, I use a laptop that has 720K 3½-inch disk drives. For convenience' sake, I'd like to have a 3½-inch drive in the Portable. Can I replace one of my Portable's 5¼-inch floppy disk drives with a 720K 3½-inch drive?*

Compaq will tell me only that doing so is "not a factory-approved modification." But then, no modification is acceptable in Compaq's eyes—the manual doesn't even tell you how to open the machine to put in an expansion board. Compaq would probably like me to buy a new machine, but my old one is doing just fine, thank you.

*Nicholas R. Clifford
Middlebury, Vermont*

A. You can replace the Compaq Portable's 5¼-inch drive with a 3½—but not easily. To do so, you'll have to retap the 3½-inch drive's mounting-screw holes, make or buy a longer floppy disk controller ribbon cable, and modify the CONFIG.SYS file of your boot disk (DOS 3.20 or a later version is required).

To get the 5¼-inch drive out of the Portable, remove the plastic top, the metal cover over the expansion cards, the drive-mounting screws in the center of the rear rubber shock mounts only (for both drives), and the metal cover over the drives. Then flip the Portable on its face and re-

move the plastic bottom and the drive-mounting screws in both rubber shock mounts of drive B:. Put the unit back on its feet, disconnect the video cable from the middle of the second card, disconnect the floppy disk controller cable from the first card and from the drives and put it aside, and remove all expansion cards. Finally, unplug the power connector, remove the screw in drive B's front rubber shock mount, and slip the drive out. So far, so good; now comes the hard part.

The Portable's drive-mounting screws are not PC compatible and won't fit the holes in the 5¼-inch rack that holds the 3½-inch drive. Use the drive-mounting screws to retap the holes before putting the drive inside the Portable. Then slip the drive into position and replace the screw in the front rubber shock mount. Flip the Portable on its face again, replace the two bottom mounting screws, and put it back down.

Look at the controller cable that you removed earlier. The length of the cable between the drive connectors is too short to span the distance between the 5¼-inch and 3½-inch drives because the 3½-inch drive's connection point is lower than the original 5¼-inch drive's. Make or buy a new cable that fits, and you can put the Portable back together.

At this point you have a working 360K 3½-inch drive B:. To make it a 720K drive, you'll need to modify your boot disk's CONFIG.SYS file. If you're using DOS 3.2x, add the line
DRIVPARM = /D:1/F:2
If you're using DOS 3.30 or a later version, use
(continues)

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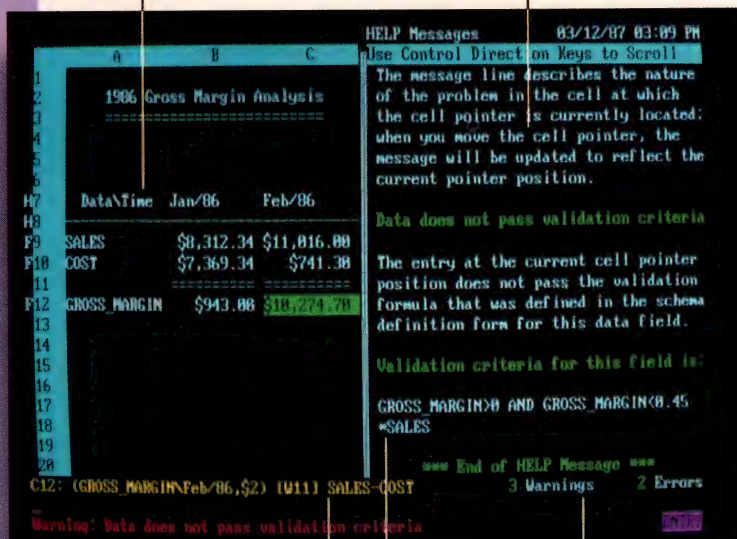


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```

A>DEBUG
-A
xxxx:0100 MOV AX,4301
xxxx:0103 MOV CX,0
xxxx:0106 MOV DX,120
xxxx:0109 INT 21
xxxx:010B
-E 120 "d:\path\filename.ext",0
-G = 100,10B

AX=FF02 BX=0000 CX=0000 DX=0120 SP=FFEE BP=0000 SI=0000 DI=0000
DS=xxxx ES=xxxx SS=xxxx CS=xxxx IP=010B NV UP EI PL NZ NA PO NC
xxxx:010B xx mnemonic instruction
-Q
<Enter> ;Start DEBUG
<Enter> ;Invoke DEBUG's assembler
<Enter> ;DOS Change Attribute call
<Enter> ;Attribute for normal file
<Enter> ;Point to file name at 0120
<Enter> ;Execute DOS call in AX
<Enter> ;No more instructions
<Enter> ;Drive, path, & file name
<Enter> ;Execute

AX=FF02 BX=0000 CX=0000 DX=0120 SP=FFEE BP=0000 SI=0000 DI=0000
DS=xxxx ES=xxxx SS=xxxx CS=xxxx IP=010B NV UP EI PL NZ NA PO NC
xxxx:010B xx mnemonic instruction
-Q
<Enter> ;Quit DEBUG

```

FIGURE 1: This DEBUG procedure resets a hidden file's attribute quickly and easily.

DEVICE = DRIVER.SYS

/D:1/ F:2

instead, and remember to format your 3½-inch disks to 720K with the command **FORMAT C:** (using **FORMAT B:** will yield 360K disks). In either case, re-boot, and your Portable's new drive B: is ready for your 720K disks.

A Faster File Finder

After reading "Hunting the Hidden File" (*The Help Screen*, PCW, May 1988), reader John Switzer sent in his method for turning a hidden file into a normal one so that it can be deleted:

"Although your advice about removing hidden files was correct, directly modifying the disk directory sectors is a little extreme, especially when a quicker and easier solution is available. You can use **DEBUG** [found on the DOS Supplemental Programs disk of versions prior to DOS 3.30 and on the Operating disk for versions 3.30 and later] to write and run a very short assembly language routine that calls the DOS function for changing a file's attribute byte. With the attribute byte set to zero (normal, unhidden file), you can

then delete the file. This technique is far safer than directly modifying disk sectors and, unlike the May *Help Screen* solution, easily reveals files hidden in subdirectories."

My thanks to Mr. Switzer. To use his method, slip a disk containing a copy of **DEBUG** in drive A:, log on to that drive with **A: <Enter>**, and type the characters shown in bold in **FIGURE 1**, pressing **<Enter>** at the end of each line as indicated. (Don't enter the explanatory comments, which begin with semicolons, on the right.) For **d:\path\filename.ext**, substitute the drive, path, file name, and file extension of the hidden file. Remember to enter the double quotation marks, one set before the drive letter and one after the file extension, and the comma and zero that end the line. The command **G = 100,10B** tells **DEBUG** to execute the instructions that you have entered. You can ignore **DEBUG**'s subsequent screen output and quit; the file is unhidden.

Third Floppy for PC and XT

Reader James Beckett objects to the solution presented in "A Third Floppy Drive" (*The Help*

Screen, PCW, February 1988), which requires the installation of a new floppy disk controller when a third internal floppy disk drive is installed. Beckett points out that "...one can purchase an external floppy drive cable [which attaches to the external rear connector of an XT's or PC's floppy disk controller] and loop it back into the XT [or PC] through an unused [expansion] slot opening. You do not need a new floppy disk controller; only an external drive cable, a 3½-inch drive, and a mounting kit." Although this approach will work, bear in mind that the uncovered expansion slot increases the amount of radio frequency interference emitted from the PC and alters the internal airflow used to extract component-damaging heat from the system. ●

Do you have any questions concerning the IBM PC or compatibles? Send them to The Help Screen, PC World, 501 Second St., San Francisco, CA 94107, or electronically to MCI Mail Karl Koessel/336-4141, CompuServe 74055,412, or The Source STE908.



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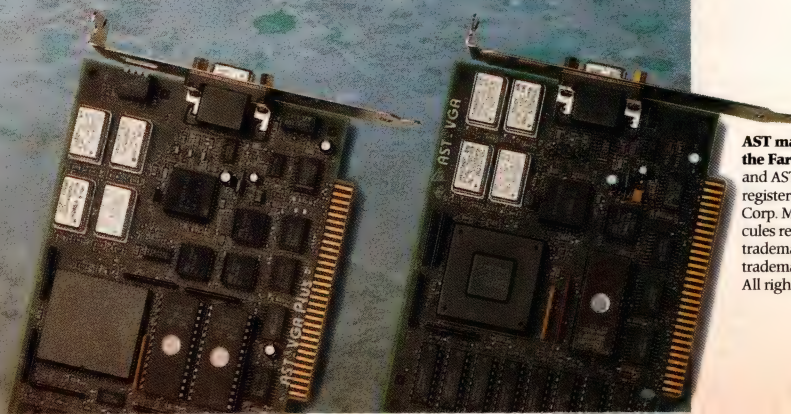
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Edited
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Down in the Dumps

Have you ever accidentally started printing midpage because you previously printed a screen with <Shift>-<Print Screen> and forgot to advance the paper? My memory-resident program, PSFF.COM, will prevent that mishap by dumping your screen and pressing the formfeed button for you.

PSFF.COM produces normal printouts of the display when you press the left <Shift> key with <Print Screen>. But press the right <Shift> key with <Print Screen>, and the program adds a formfeed after printing the screen. This allows the next print job to begin at the top of a new page.

Bruce L. Gregory
Ridgefield, New Jersey

Editor's note: PSFF.COM works on enhanced, 101-key keyboards, too. Just hold down the right <Shift> key and press <Print Screen>.

To create PSFF.COM, enter the BASIC program X-MAKER2.BAS (LISTING 1) and add the lines shown in PSFF.DAT (LISTING 2). Run the result. Then, at the DOS prompt, type PSFF and press <Enter> to install the modified print-screen function. Do this only once after booting to avoid loading multiple copies of the memory-resident program. For the programmers among you, PSFF.ASM (LISTING 3) lists the program's as-

sembly language source code. Assemble the listing with Microsoft's Macro Assembler, using the commands MASM PSFF;, LINK PSFF;, and EXE2BIN PSFF PSFF.COM.

dBASE Made Perfect

I keep a mailing list in a dBASE III data base from which I create WordPerfect secondary merge files. Because there is no direct way to translate dBASE files into WordPerfect documents, I wrote CREATSEC.PRg (LISTING 4) to do the job for me. The program first creates a temporary file in delimited ASCII format and then uses WordPerfect's CONVERT utility to create the merge document, ready for printing form letters or envelopes.

Because your name-and-address file structure is probably different from mine, you'll need to modify the field names listed in the line that begins with 'flist='. You might also want to add your WordPerfect directory to the RUN command. For example, if CONVERT.EXE is stored in C:\WP, change RUN CONVERT to RUN C:\WP\CONVERT in LISTING 4.
(continues)

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```

10 DEFINT A-Z:CLS:KEY OFF:DEF FNHEX(X$)=VAL("&h"+X$)
20 MSG$="Now testing for data errors...please wait" : GOSUB 190
30 SUM=0:READ LN:IF LN<0 THEN 80
40 READ H$:IF VAL(H$)<0 THEN 70
50 IF LEFT$(H$,1)="*" THEN GOSUB 210 : GOTO 40
60 SUM=(SUM+FNHEX(H$))*2:SUM=(SUM\256)+(SUM MOD 256):GOTO 40
70 READ CKSUM$:IF (SUM MOD 256)=FNHEX(CKSUM$) THEN 30 ELSE GOTO 170
80 MSG$="Press any key except ESC to create "+F$+"": "
90 GOSUB 190 : A$=INPUT$(1) : PRINT : IF A$=CHR$(27) THEN END
100 LOCATE 6,1:PRINT "Working...";
110 OPEN F$ AS #1 LEN=1 : FIELD #1,1 AS BX$
120 READ LN:IF LN<0 THEN 160
130 READ H$:IF VAL(H$)<0 THEN READ CKSUM$:GOTO 120
140 IF LEFT$(H$,1)="*" THEN GOSUB 240 : GOTO 130
150 LSET BX$=CHR$(FNHEX(H$)) : PUT #1 : GOTO 130
160 CLOSE:PRINT:PRINT F$;" has now been created.":END
170 PRINT:PRINT "Error in DATA line";STR$(LN);".";
175 PRINT:PRINT "SUM=";SUM
180 PRINT "Check your work.":BEEP:END
190 CLS : LOCATE 3,1 : PRINT "X-Maker II" : RESTORE : READ F$
200 LOCATE 5,1,1 : PRINT MSG$; : RETURN
210 ZZ=VAL(MID$(H$,2)) : FOR I=1 TO ZZ
220 SUM=SUM*2 : SUM=(SUM\256)+(SUM MOD 256)
230 NEXT : RETURN
240 ZZ=VAL(MID$(H$,2)) : FOR I=1 TO ZZ
250 LSET BX$=CHR$(0) : PUT #1 : NEXT : RETURN

```

LISTING 1: Use X-MAKER2.BAS, *.*'s program-making program, with PSFF.DAT (LISTING 2).

```

1000 DATA "psff.com"
1010 DATA 1,EB,3F,90,*4,FB,50,1E,E4,60,3C,37,75,2A,-1,F3
1020 DATA 2,33,C0,8E,D8,A0,17,04,A8,01,74,1F,E4,61,8A,E0,0C,-1,1C
1030 DATA 3,80,E6,61,8A,C4,E6,61,B0,20,E6,20,CD,05,52,BA,*2,B8,-1,1E
1040 DATA 4,0C,00,CD,17,5A,1F,58,CF,1F,58,2E,FF,2E,03,01,B8,-1,49
1050 DATA 5,09,35,CD,21,89,1E,03,01,8C,06,05,01,BA,07,01,B8,-1,1D
1060 DATA 6,09,25,CD,21,BA,62,01,B4,09,CD,21,BA,41,01,CD,27,-1,90
1070 DATA 7,0D,0A,50,53,46,46,20,49,6E,73,74,61,6C,6C,65,64,-1,34
1080 DATA 8,0D,0A,24,-1,D8,-1

```

LISTING 2: Using BASIC, merge PSFF.DAT's DATA lines with X-MAKER2.BAS (LISTING 1), and run the combined program to create PSFF.COM.

```

;-----
; PSFF.ASM: Print Screen With Formfeed
; Written by: Bruce Gregory
;-----

cseg segment para public 'CODE'
    assume cs:cseg,ds:cseg,ss:cseg,es:cseg
    org 100h ; .COM file entry point
begin: jmp start ; jump to TSR loader

(CONTINUES)

```

LISTING 3: Assemble PSFF.ASM to create PSFF.COM, adding automatic formfeeds to your print-screen commands.

(continues)


```

;----- New keyboard interrupt 9 handler
addr off dw 0 ; original interrupt vector (offset)
addr seg dw 0 ; original interrupt vector (segment)
int9: sti ; turn on interrupts
      push ax ; save ax register
      push ds ; save ds register
      in al,60h ; get keyboard data
      cmp al,37h ; test for <Print Screen> key
      jne exit ; exit if key is not <Print Screen>
      xor ax,ax ; set ax = 0000
      mov ds,ax ; set ds = 0000 to read BIOS data
      mov al,byte ptr ds:[0417h] ; get keyboard flags
      test al,01h ; test for right <Shift>
      jz exit ; exit if right <Shift> not down
      in al,61h ; get keyboard control information
      mov ah,al ; save in ah
      or al,80h ; set high bit
      out 61h,al ; clear keyboard
      mov al,ah ; get saved control information
      out 61h,al ; restore 8255A output data
      mov al,20h ; end of interrupt command
      out 20h,al ; send command to int control port
      int 05h ; perform screen dump
      push dx ; save dx register
      mov dx,0000h ; select printer #0
      mov ax,000Ch ; ah=print char; al=ASCII formfeed
      int 17h ; perform formfeed
      pop dx ; restore saved dx register
      pop ds ; restore saved ds register
      pop ax ; restore saved ax register
      iret ; return from interrupt

```

```

;----- Jump to original BIOS keyboard interrupt (9)
exit: pop ds ; restore saved ds register
      pop ax ; restore saved ax register
      jmp dword ptr cs:[addr off] ; jump via original vector

```

```

;----- Terminate and stay resident (TSR) loader
start: mov ax,3509h ; get current interrupt 9 vector
      int 21h ; call DOS function
      mov addr off, bx ; save offset address
      mov addr seg, es ; save segment address
      mov dx,offset int9 ; ds:dx = address of our handler
      mov ax,2509h ; change vector to our int 9 code
      int 21h ; call DOS function
      mov dx,offset message ; display "installed" message
      mov ah,9 ; print ASCII$ string
      int 21h ; call DOS function
      mov dx,offset start ; ds:dx = lowest available address
      int 27h ; terminate, stay resident to ds:dx
message db 13, 10, 'PSFF Installed', 13, 10, '$'
cseg ends ; end of segment
end begin ; end of text

```

LISTING 3: (continued)
(continues)

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The program prompts you for the names of two files: the name-and-address data base file and the merge file you want to create. After replying, press <Enter> to select all records, or specify a condition such as zip-code="82801" to select only matching records.

After creating the delimited file, TEMP.MMF, the program runs WordPerfect's CONVERT utility, creating the merge document and erasing the temporary file.

Jim Griffin
Sheridan, Wyoming

Editor's note: Use any ASCII editor to enter and save CREATESEC.PRG. Make sure you have WordPerfect's CONVERT.EXE program on disk. From the dBASE dot prompt, type DO CREATESEC and press <Enter> to run the program.

Now You See It

While editing WordPerfect documents, I often need to view the preceding or following page without moving the cursor from the current line. The only way to accomplish this with native commands is to move the cursor to the top or bottom of the screen and press the cursor keys until new lines come into view. I then have to reposition the cursor to continue editing.

To speed up the process, I wrote two macros, ALTT.MAC and ALTB.MAC [FIGURES 1 and 2]. To create the macros, type the keystrokes in the left column of each figure exactly as shown. The comments on the right explain how the macros operate.

Using the macros is easy. Press <Alt>-T, and the current line moves to the top of the

```
* CREATESEC.PRG Program to create a WordPerfect merge document
* from a dBASE name-and-address data base file

CLEAR
SET TALK OFF
ACCEPT "Data base to use? " TO db
ACCEPT "Name of WP merge file? " TO fo
ACCEPT "Condition for search? " TO con
con=IF(LEN(con)>1,"FOR "+con,"")
USE &db
fi="TEMP.MMF"
flist="FIELDS fname,lname,address,city,state,zipcode"
COPY TO &fi &flist &con TYPE DELIMITED
RUN CONVERT &fi &fo 7 , (13)(10) ",(13)(10)
ERASE TEMP.MMF
```

LISTING 4: Run this dBASE III program, CREATESEC.PRG, along with WordPerfect's CONVERT utility to create a merge document from a name-and-address data base file.

<Ctrl>-<F10>	Turn on the macro recorder
<Alt>-T	Give the macro a name
<Ctrl>-<Enter>	Enter a hard page break
<Ctrl>-<Home>	Issue goto command
<Cursor Up>	Position cursor at top of page
<Backspace>	Delete the hard page break
<Ctrl>-<F10>	Turn off the macro recorder

FIGURE 1: This WordPerfect macro, ALTT.MAC, moves the current line to the top of the screen.

<Ctrl>-<F10>	Turn on the macro recorder
<Alt>-B	Give the macro a name
<Ctrl>-<Enter>	Enter a hard page break
<Cursor Left>	Move to bottom of previous page
<Ctrl>-<Home>	Issue goto command
<Cursor Down>	Put current line on bottom of screen
<Home><Home><Cursor Right>	Position cursor ahead of hard page break
<Delete>	Delete the hard page break
<Home>	Specify extreme move
<Cursor Up><Cursor Up>	Adjust bottom line
<Cursor Up>	
<Home><Cursor Down>	Move cursor to line
<Ctrl>-<F10>	Turn off the macro recorder

FIGURE 2: This WordPerfect macro, ALTB.MAC, moves the current line to the bottom of the screen.

screen, exposing the next 23 lines. Press <Alt>-B and the current line moves to the bottom, showing the 23 lines above it. And all without ever touching a cursor key.

Gary Corbin
Washington, DC

Editor's note: The cursor's position will change if <Alt>-B is invoked when the cursor is 23 lines or less from the top of the document. Fortunately, there is no reason to execute the macro in this situation because all the text that would be revealed is already on screen.
(continues)

DOS Sojourns

Microsoft Word would have my vote for top word processor but for one idiosyncrasy: The <Esc> Library Run command allows only a single DOS command before returning to the program. This limitation makes entering multiple DOS commands exasperating. For example, even a simple job like changing directories and running a utility program requires too many keystrokes for my taste.

Luckily, I've discovered a simple work-around to the problem. Just type C:\COMMAND at the 'Library Run' prompt. This loads a secondary copy of COMMAND.COM, which allows you to enter as many DOS commands as you want. After you're done sojourning in DOS, type EXIT and press <Enter> to return to Word.

James Reynante
San Diego, California

Editor's note: Mr. Reynante's suggestion works for any program that allows you to run a DOS command. For example, from WordStar's opening menu you can press R (for 'Run a program'), type C:\COMMAND, and press <Enter>. After entering your DOS commands, type EXIT and press <Enter> to continue editing.

Pop-Up Bug

I discovered a bug in POP-UP.PAS ("Pascal Pop-Ups," *Star-Dot-Star*, PCW, February 1988). Because the cursor position is not initialized, the program might not work properly. Adding

```
ulc := 20; ulr := 6;
just before the TextMode(3)
statement ensures smooth
operation.
```

George L. Shevenock II
Pontiac, Michigan

Editor's note: A printing glitch also deleted the single quote marks surrounding the text inside the Write statements on page 271. Each statement should appear in the following form: Write('text');

DEVELOPER'S TOOLBOX

Software tools are indispensable to program developers, easing the chore of writing programs. Properly equipped, a programmer can take less time to produce an application with more capabilities and fewer bugs. But with so many programming utilities available, how do you find the right tools for the job?

Developer's Toolbox will help you answer that question. Each month in this new *Star-Dot-Star* section, I'll cover products of special interest to in-house developers—those who spend a major portion of their time programming—regardless of the language they use.

I'll be looking at editors, engines, environments, debuggers, on-line guides, fourth-generation application development systems, graphic-interface tool kits, and more. And I want you to tell me about the tools you wish someone would invent. (Maybe someone already has.) Let me know about your favorite programming utilities. Write to me in care of the address at the end of this column, or send MCI mail directly to my handle, TSWAN.

Do You Need a Programmer's Editor?

Many compilers and assemblers, including Microsoft's Macro Assembler, C, and Pascal, plus the newer Turbo languages from Borland, operate directly from the DOS prompt. To write programs in these languages, you need a separate editor. After trying out several packages, I've settled on *Brief* from Solution Systems.

Like dozens of competitors, *Brief* edits plain ASCII text files—but that's just the beginning. Version 2.01 comes with a macro library, a setup program, and a macro for running Turbo Pascal 4.0. The User and Macro Language Guides are well written, and the tutorial is a breeze.

Brief has scores of features that developers will appreciate. The macro language is more like a complete C development system than a macro processor. How many files would you like open on screen simultaneously, ready to edit? *Brief*, as it is shipped, can open over 100 files at a time. You can choose from several indentation and template choices for Pascal and C programmers, and the code you write is formatted automatically. *Brief*'s undo command is the best I've seen in any program. Pressing <Alt>-U reverses the previous 30 (adjustable to 300) commands or mistakes, making *Brief* the most forgiving editor around.

You can configure *Brief* to run your favorite compiler or assembler, although compiling this way

can chew up memory faster than a 1-2-3 whiz kid on a roll. Instead, most users will probably exit the editor to compile and then restart it to continue editing. According to Solution Systems, a planned revision will swap *Brief* to expanded memory or to a RAM disk, leaving 8K resident and allowing you to run memory-hungry compilers like Turbo C.

Brief has a few drawbacks. I wish I could select file names from a directory. Keyboard reassignments should be easier to make. And there's only one cut-and-paste buffer; I could use several.

Despite these minor gripes, though, *Brief* is a top-notch editor for developers. You'll still need your word processor for

prose, but for writing code, you won't find shortcomings in *Brief*.

WHERE TO BUY

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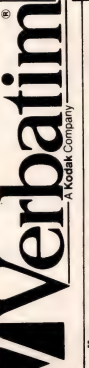
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PostScript Telegraphs Its Punch

PostScript, Adobe's PC-based page description language, is suddenly omnipresent.

It's pricey and powerful—and, for now, probably better heard about than seen.

Technically speaking, Morse code was the first software protocol. In the hands of a few skilled masters, its dots and dashes made the world a bit smaller. Today, Morse code's dozens of descendants describe ways in which computers communicate over wires. Two relatively new protocols appear certain to flourish: SQL and PostScript, Morse codes for the 1990s.

What SQL is to the business of querying big data bases, Adobe's PostScript is to exploiting new-age laser printers. PostScript printers win the prize as the costliest implementation of a de facto standard in the PC arena; many carry price tags exceeding \$5000.

It's a sign of the times that an arcane specification best left to software developers and graphic artists has become a buzzword among users at large. For many of these users, PostScript is simply the latest in a line of printer protocols; it is to laser printers what Epson and Diablo emulation are to dot matrix and daisy wheel printers, respectively. But that, of course, is only part of an evolving story.

PostScript's relatively quick rise to marketplace stardom poses a blunt question to PC users considering PostScript hardware: to pay or not to pay?

To respond intelligently, we must understand the special needs that PostScript satisfies, and why—valuable as it is—it should remain invisible to most of us.

Some PC standards come and go quickly, eclipsed by fresh technologies. The Lotus/Intel/Microsoft expanded memory specification is a classic example, doomed in its prime by OS/2's 16MB reach. PostScript looks much harder, but it's still a kid. Although new applications by the score include token PostScript support, only a paltry number exploit it fully. If you're given to cost-benefit analyses, that fact might give you pause about adding a PostScript printer to your arsenal.

Calling a Convention

Like Morse code, PostScript is a *convention* (that is, a standard definition) for a certain kind of communication. Just as Morse code enables individuals at either end of the wire to transmit and receive, PostScript ties desktop publishing software to a new generation of intelligent, high-resolution laser printers.

Conventions and standards don't just happen; they're usually a blend of marketing prowess and technical excellence. Epson sold dot matrix printers by

(continues)



**Robert
M. Carr**

the shipload, and in due course its PC-to-printer dialect converted the industry. Other protocols, PostScript included, are anointed as standards through collective industry-wide support. PostScript licensees include such heavyweights as Apple Computer, Dataproducts, Digital Equipment, IBM, QMS, Texas Instruments, and Wang Laboratories. In this case, the industry consensus behind PostScript offers some evidence of how laser printing has transformed the nature of the output game.

For openers, PostScript's rise reflects the shortcomings of several aging standards, including parallel and serial communications. Both varieties of cable move data fairly slowly. These thin wires were sufficient when printers didn't have much to send; a daisy wheel printer theoretically needs no more than 2K of data to print a page. High-resolution laser printers, however, can easily require a megabyte of data to generate a page of graphics at 300 dots per inch. Transmitting a 1MB bit map by serial cable can easily kill an afternoon (or seem to).

To pick up the tempo while continuing to rely on cables with such admittedly limited throughput, you need a high-level protocol like PostScript—essentially a description rather than a bit map—that reduces the amount of data moving over the wire.

This matter of throughput is closely related to how the printer handles the data once it arrives. If you use a high-level, vector-style protocol like PostScript with a laser printer—a bit map device—the printer must be

equipped with its own horsepower. That's partly why PostScript printers include full 16-bit CPUs and enough RAM to rebuild the vector description in high resolution.

There's yet another reason why describing printed pages with bit maps is unwieldy. Bit maps are device dependent, a constraint that tends to inhibit the urge to hook up any hardware to, or run any software on, a wide variety of printers. Unlike the Epson and Diablo standards, which achieved a sort of device independence as printer manufacturers and software vendors backed them, PostScript was engineered to operate entirely free from the vagaries of anyone's printer.

The PDL Club

PostScript belongs to the new genre of page description languages (PDLs). All PDLs provide compact, abstract summaries of the printed page. With a PDL, you can describe the text and graphics that make up a page with commands like 'Draw a line from point 1 to point 2' or 'Print the following characters (at a certain location).'

As it converses with the printer, the PC describes the page in very general terms, delving into detailed bit maps only when the original form of an image—say a company logo—was derived from a paint program or similar source. The high-level description is capable of mixing text and graphics fluidly and assumes nothing about printer attributes.

Unlike other PDLs (which respond to a fixed set of commands), PostScript is both a page description language and a full programming language. PostScript combines variables,

arrays, looping, and procedures with a host of graphic and text primitives. It's deft enough to handle a broad spectrum of printing technologies, from desk-bound laser printers to Linotype phototypesetters.

By combining the flexibility of a programming language with a printer-oriented page description language, PostScript delivers ample power to those who need to design sophisticated graphics applications. In practice, a software developer is more likely to describe an image by inserting PostScript routines within the larger program than to write an entire PostScript-based application.

PostScript programs require a PostScript interpreter. Like BASIC, the PostScript interpreter needs a CPU on which to run, and PostScript programs are sent to the printer as straight ASCII text files. PostScript thus keeps the instruction stream legible, so it's easy to capture such instructions to a file and review or tinker with them before they're routed to the printer.

Ideally, PostScript-savvy desktop publishing packages will hide the protocol from view, apart from those occasions when you might want to view or modify the actual instructions. As a rule, PostScript will be about as visible to you as Morse code was to the customer who filled out the telegraph message and handed it to the telegraph operator. The only interface you'll need to conquer will belong to the primary application; behind the scenes, PostScript will be there, supercharging the application at print time.

On the other hand, because PostScript is interpreted, it can (*continues*)

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be used in an interactive mode much as BASIC can. A good number of PostScript printers support such a mode, in which a PC running terminal emulation software can communicate with the printer directly. You interact with a command-line prompt, issuing commands one at a time in a fashion reminiscent of *dBASE*'s dot prompt.

The point isn't that you'll regularly want to run a PostScript printer in interactive mode, but that doing so is at least feasible. With its readable ASCII instruction streams, interpretive mode, and programmability, PostScript is, on paper, a consummate printer protocol.

Just Your Type

Just as it provides superb printer control, so PostScript offers an unprecedented ability to manipulate images themselves. It does not distinguish between text and graphics, treating a character as just another graphics object. This tack fosters the effortless intermingling of text and graphics that is so crucial to desktop publishing.

Each PostScript font exists within the printer in a single, universal description called an *outline font*. These fonts enable PostScript to generate type in any size, weight, detail, and rotation. To a greater degree than in other PDLs (which assume the laser printer stores actual bit-map fonts), PostScript enables you to set fractional point sizes, set font width and font height separately, slant text, fill text with a shade or pattern, and control the stroke width of font characters.

PostScript programs can include their own libraries of rou-

tines. Accordingly, it's a simple matter for an application to download routines—called *procedure definitions*—appropriate for the print job at hand. Such definitions underscore PostScript's readability, compactness, and flexibility. A CAD program can download a shorthand "rectangle" procedure, for instance, or you can write a new procedure that displays text in any offbeat design you like. The resulting procedure can be downloaded to a PostScript printer for subsequent reuse.

PostScript's business is high-level image description, so it should come as no surprise that it's at its weakest as a file interchange medium. The better desktop publishing programs will continue to import text formatting directly from the word processing source, omitting PostScript from that loop.

Behind the Specs

With its obvious gifts, should a PostScript printer be on your must-buy list? Check your software shelf: See any applications

that tap PostScript's latent talents? Powerful as PostScript is, many (if not most) users today may find it constitutes overkill—and that it's overpriced. Few can quibble with Adobe's position that PostScript is an excellent model for PDLs, but for now, you can, and perhaps should, make do with less.

In a year or two, the previous paragraph may be good for a smile. By then, graphics-intensive Presentation Manager applications will have hit the market, and a new crop of desktop publishing applications will be looking their best on PostScript printers. But it's doubtful that spreadsheets, data managers, and word processing packages will exploit PostScript's advanced features—at least not during the lifetime of any printer you buy in 1988.

The ostensible PostScript support in some of today's garden-variety applications doesn't give much cause for hope. Most treat PostScript devices as little more than dot matrix printers, at best splicing an occasional bit map into endless rows of characters. Still, as an internal standard, PostScript's future success lies largely with the software development community, so my pessimism may not be entirely warranted.

If money is the object here, the economics of PostScript printers may already be in flux. As a language, PostScript is as prone to cloning as were *dBASE*, C, and Pascal. A dozen companies reportedly are racing to produce PostScript-compatible interpreters, in the hope that printer manufacturers seeking

(continues)

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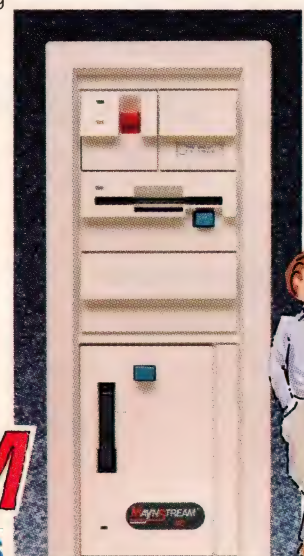
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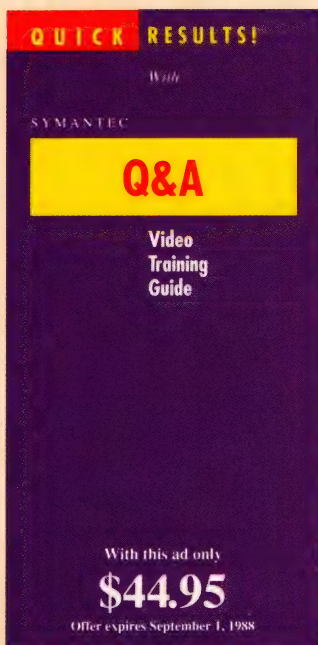
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to save on licensing fees will prefer a look-alike to the genuine article. Would-be clone vendors are promising to couple higher performance with lower prices.

Few PostScript clones have made it to market yet, so judgments are premature. For now, if the PostScript-compatible printer in question works well with the software you plan to use, by all means consider it. Compatibility questions are always dicey, however; if the given application truly exploits PostScript, you might consider pairing it with a PostScript clone only after both have been extensively tested.

Most users need affordable printing technology, scaled more to their real needs than to PostScript's inherent power. For many, lower-priced printers with simple PDLs that permit multiple fonts in a text-based document will suffice. By the time applications order PostScript to turn back flips, today's laser printing marvel will be ready for an upgrade. And by then, PostScript printers should easily cost half as much.

None of this is meant to take anything away from PostScript as a printer protocol with staying power. Some very heady companies have already adapted PostScript as a standard and included it in *some* of their printers. Also like Morse code, PostScript figures to endure—whether most of us see it or not. Also like Morse code, it matters only that we see its results. ●

Robert M. Carr is the creator of Framework II and cofounder of Go Corporation, a software start-up.



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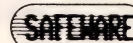
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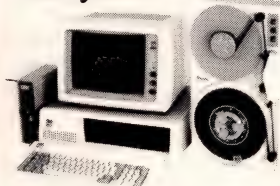
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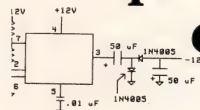
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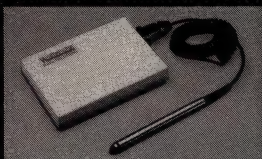
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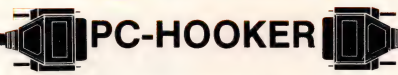
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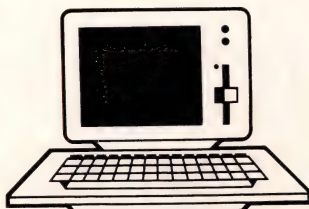
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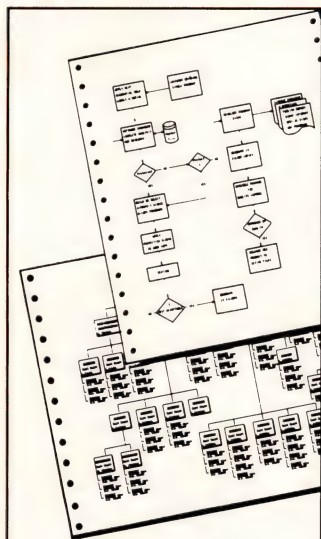
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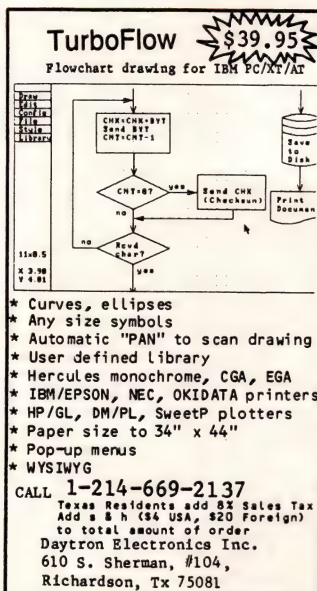
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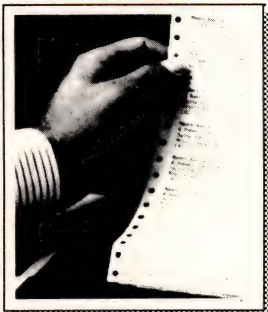
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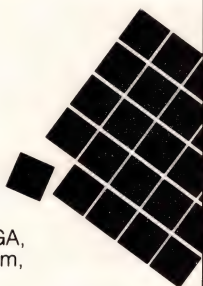
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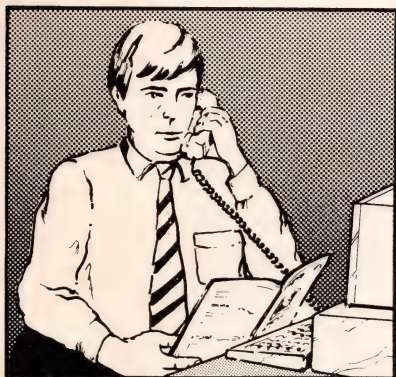
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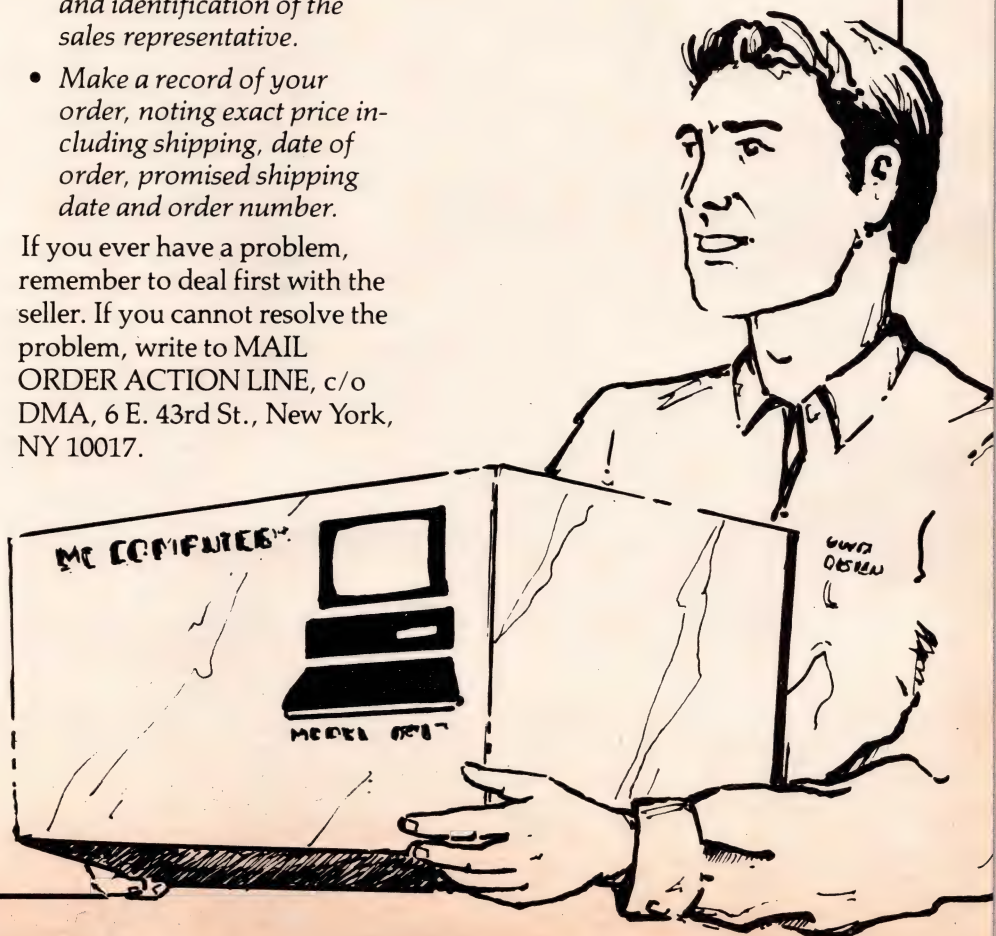
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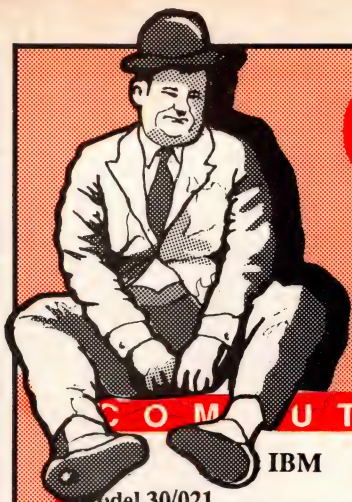


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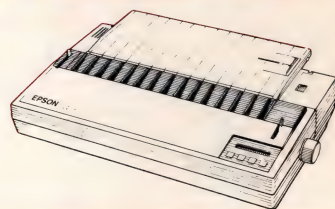
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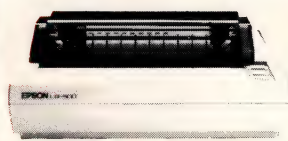
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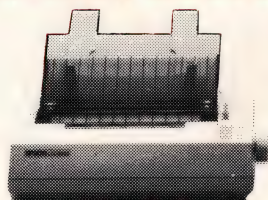
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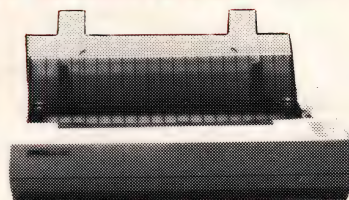
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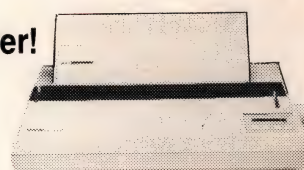
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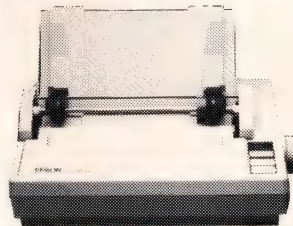
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 - Cut sheet feeder



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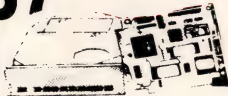
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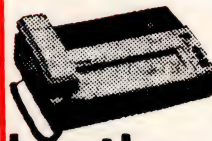


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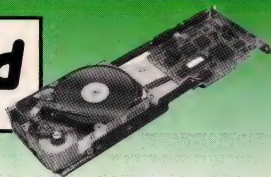
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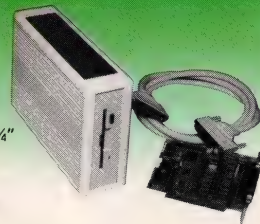


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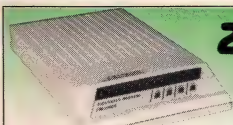
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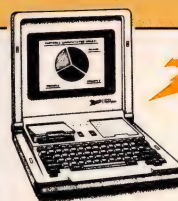
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Microsoft Excel	\$290
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Paradox 2.0	\$418
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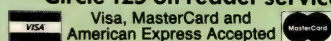
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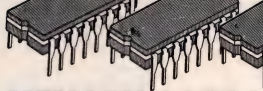
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- AT SuperMULTI I/O w/floppy 119.
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- PS/2 Floppy controller 1.4Mb 89.
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- XT Turbo w/BIOS, 10MHz 99.
- AT 286 w/BIOS, 10MHz 289.
- AT Baby w/BIOS, 12MHz 299.
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HARDWARE

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- Advantage 2/386, mod.80, 1Mb 725.
- Advantage 2/286, PS/2, OK 349.
- Advantage Premium 286, 512K 389.
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- AST Sixpackplus, OK 119.

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- Above board PS/286, model 30 349.
- 8087 (5MHz) 102.
- 8087-1 (10MHz) PS/2 105.
- 8087-2 (6MHz) 185.
- 80287-6 (6MHz) 205.
- 80287-8 (8MHz) 255.
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- 80387-16 (16MHz) 549.
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Advanced XT Clones

- AdvancedXT base system 489.
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- Premium386Model340,40Mb 4699.

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- Deskpro286 Model20 call.
- Deskpro386 Model40 call.
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- HyundaiAT call.
- Hyundai PC LAN Terminal call.

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- PC7100 Portable, 20Mb 2195.
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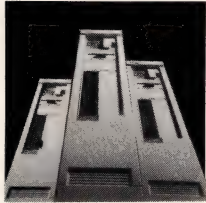
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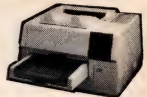
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The Data Base Solution



*Michael
G. Rubin*

The role of the electronic spreadsheet in popularizing personal computers is well documented. In fact, the spreadsheet has proven so effective and its interface so intuitive, we tend to use it for nearly everything.

At my company I've noticed an alarming—though not surprising—tendency to force-fit all data collection and manipulation functions into row-and-column format. For example, a co-worker in our sales department asked me to review a 2000-row behemoth that wasn't calculating properly. This 96K wonder actually comprised 39 concatenated reports and required two full minutes to load on an admittedly antiquated 8088 machine.

The disadvantages were obvious and would have been only slightly ameliorated by a faster processor. Locating specific data elements required painstaking scrolling. Copious amounts of disk space and RAM were exhausted by duplicate column and row headings. And generating even the most routine output from this information "system" was a study in thumb twiddling.

Obviously the spreadsheet wasn't meant to handle all our PC tasks, any more than the microwave oven was expected to cook all our meals. I'm as addicted to slash commands as the

next guy, but for the sake of company productivity, I find myself faced with the difficult task of moving the PC users I support away from the comfort of spreadsheets and into the uncharted realms of data base management software.

I surveyed the 50 PC users in our corporation and found that half had installed *1-2-3* or *SuperCalc* on their machines, while only two had even looked at a data base management package. Predictably, the spreadsheet jockeys loved the ease of use and modeling power inherent in a worksheet and thought that they had to tolerate the output limitations. Spreadsheets are fine for quick-and-dirty analyses—and even for some fairly sophisticated ones—but productivity bogs down when applications get into thousands of cells.

I'm tempted to offer these frustrated power users the "magic" solution: a data base package that could reduce data redundancy, storage constraints, and I/O inefficiencies.

We've already achieved indirect labor productivity gains of 15 to 20 percent in some departments by developing data base applications for material planning and automotive fleet management.

But anyone who has dueled with the *dBASE* dot prompt

knows that casual contact with a fully relational data base can lead to headaches, nausea, and other flu-like symptoms. A data base requires commitment, and knowing that prevents me from handing over *dBASE*'s encyclopedic manuals.

Instead I've offered to teach what I know about *dBASE* to two power spreadsheet users who I suspect have the intestinal fortitude to tackle it. One has accepted; the other is thinking it over.

It's a slow start, but now that PC users have gotten their feet wet with spreadsheets, maybe more will move on to the next level. My hope is that the current round of data base software introductions—with friendlier interfaces and application generators and compilers—will encourage more people to swap rows and columns for records and fields. ●

Michael G. Rubin is director of the international division of Del Laboratories, a major cosmetic manufacturer.

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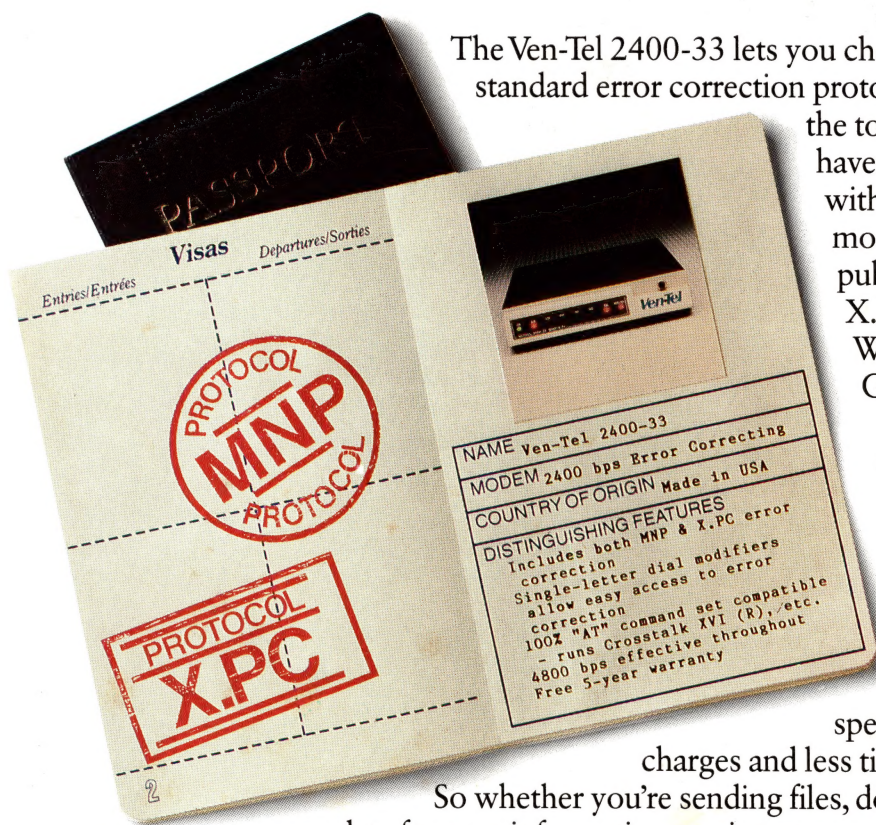


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